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THE HAIR OF THE DOG

By GEORGE BRONSON REA

JAPAN'S CHALLENGE TO THE WEST

Vol. XXXII JUNE, 1936 No. 6

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ENGINEERING FINANCE COMMERCE

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THE HAIR OF THE DOG

(Similia Similibus Curantur)

NANKING GETS A DOSE OF ITS OWN MEDICINE

By GEORGE BRONSON REA

At last we come to that "collective action" for the suppression of smuggling into and out of China foreshadowed last year in the Report of the American Economic Mission. When the Mission departed last July, the value of smuggling for the whole country was placed by the Bank of China at $154,000,000. No one particular locality enjoys a monopoly of the gentle art. It is more of a national sport in which each section tries to outdo all others in beating the Government out of its revenues.

In the interior provinces the game is played through banditry, poppy growing and running the product through cordon after cordon until it reaches its chief market in Shanghai. In the costal regions the people take to piracy and smuggling as a duck to water. Smuggling has been developed into a high art in South China where it is estimated that over $100,000,000 worth of goods are annually slipped through the customs barriers. What goes on in and around Shanghai in the matter of salt, opium, arms and other illicit traffic, and the efforts of the police to catch up with the evil-doers, is a story all by itself. No Chinese or foreign newspaper "under the guns" dares investigate or devote much space to these rackets.

Attention is now concentrated on what is transpiring in North China, not because conditions there are any worse than in the south, but because the opportunity to beat the Central Government has allegedly been created by the Japanese. Nanking avers that the loss in customs receipts has increased from $1,700,000 last August to $8,000,000 in April of this year. The actual value of the smuggled goods is not disclosed. The heinousness of the crime in North China is not so much the amount of what is smuggled, but the fact that the progressive decrease in Nanking's revenues may in time, impair its ability to meet interest payments on foreign and domestic loans secured on these revenues.

The Drama in North China

Nothing is said about the situation prior to the establishment of the East Hopei Autonomous Government, when Nanking was squeezing more than $80,000,000 annually out of this region and spending half on local military and administration and the other half on its own armies. The interests and welfare of the people of North China never entered the picture as long as Nanking could pile up domestic loans, guaranteed by imposts on their trade. The time was bound to arrive, when by their own efforts or with help from the outside, the people of North China would assert their independence.

Now, it is true that the Japanese Army created this opportunity through the terms of the Tangku Truce. It may even be admitted that the Japanese prodded these people to stand on their own feet and then injected a little serum of resistance into their spinal cords. Let us further acknowledge that this constitutes a proof of Japanese imperialism. But the fact remains that it could never have been put over without bloodshed had not the people welcomed the change. Conquest is not so easy as that, not even in China.

As we have pointed out in previous articles, given a demilitarized district anywhere throughout the vast expanse of China Proper, where the armies of the Central Government, the provincial war-lord or local bandit chiefs are prohibited from operating, the people will automatically shake off their allegiance to the foreign-recognized central faction and set up their own government and system of taxation. Whether the impetus, as in Manchuria, Jehol or North China, comes from Japan, or as in Mongolia and Hsinkiang it comes from Soviet Russia, or from the stabilizing presence of the British in Hongkong, the solicitous regard of the French for their interests in Yunnan or international concern for the maintenance of law and order in the zone around Shanghai, the result is the same.

The situation in North China is no different than that in the South. The South-western Autonomous Government applies its own tariff rates, appropriates the customs revenues to its own uses, while smuggling on a vast scale out of Hongkong and across the Indo-China border, is conducted more or less openly.

The *Kuomin* report on smuggling terminates with the following gem :

> "Statistics for 1935 show that the 21 ports from Chinwangtao on the north to Ningpo, which lies south of the Yangtze Valley, accounted for 88 per cent of the total revenue collected during the year, while the remaining 18 ports from Wenchow to the south and to Tengyueh in the west provided only 12 per cent. The encouragement given smugglers in the north becomes accordingly a direct attack upon 88 per cent of the country's revenues upon which so many foreign and domestic loans are secured."

The Situation on the South

Should the 12 per cent of customs revenues collected south of Ningpo be traced to their sources, it will probably reveal that the ports are all under the domination of Nanking and that very little or nothing is received from ports south of Swatow.

Canton has many government enterprises with whose successful operation smuggling is playing havoc. The sugar-refining industry was established to foster cane cultivation in Kwangtung and Kwangsi, but owing to the high tariffs imposed by Nanking, smuggling of this commodity into the country has been encouraged to the point where markets other than local for native grown sugar, have virtually ceased to exist.

Nanking has wiped off its books the loss of the South-western customs and other revenues, for the simple and understandable reason that it cannot afford to go to war with a coalition that displays such military strength and a grim determination to fight to maintain its independence. It is not forgotten by Nanking that the shock Southern troops which conquered the Yangtze region in 1927 were those " Ironsides " and other crack fighting divisions of Kwangtung and Kwangsi who remained loyal to their provincial leaders when the Ningpo Commander-in-Chief turned on his associates and set himself up as Number One in Nanking. The fact that Chiang Kai-shek was recognized almost immediately by the foreign Powers and, that he handed over financial control of his government to his Chekiang cronies, will never be forgotten or forgiven by the people of the Two-Kwangs who bled themselves white to defray the expenses of the campaign.

It is for this very reason that although autonomous, the South-western group does not agitate for foreign recognition of its independent status. Canton still hopes to slip a banana peel under the Chekiang war-lord and, with his downfall, will go his entire regime. China will then be governed as Sun Yat-sen, Hu Hanmin and the old revolutionary group intended that it should be, by Canton. A paper unification may be declared, a constitution concentrating power in a dictator may bring the provinces together by proclamation, but the humiliation of having been robbed of the fruits of victory just as the goal was in sight and of seeing the plums of office handed over to a provincial clique that had contributed neither arms, munitions, men or money to the cause, still rankles. To-day, to-morrow, or in the distant future the wheel will turn and Canton will come into its own. Those who hold otherwise know little of Chinese history and still less of human nature.

The Cantonese Viewpoint

It is for these reasons that the South-west is outwardly so anti-Japanese, hoping that it can prod Chiang Kai-shek into a war with Japan and bring about his downfall. The power would then pass to Canton. The 19th Route Army forced the issue in 1932 at Shanghai but Chiang sidestepped and permitted it to stand the brunt of the punishment. Tsai Ting-kai and his group is quietly awaiting the opportunity to get even. For these, and other good reasons, Chiang Kai-shek is willing to recognize the autonomy of the South-west and surrender to its government the customs and other Central Government revenues. But any further undermining of his finances by the establishment of similar set-ups in the North would deprive him of the means of maintaining his armies, weaken his position and lay himself open to the vengeance of Canton. So in his dire extremity, he falls back on that outside intervention he so vigorously opposes as illegal and in violation of treaties when resorted to by another faction.

It must never be forgotten that war against the Central Government is not considered an act of rebellion but a contest for supremacy between the independent provinces and the faction temporarily in control of the capital and recognized by the foreign governments. *The independent provinces have no rights under* the treaties which foreign powers are obligated to respect. The treaties and the Covenant have deprived them of their just rights and handed them over, bound hand and foot, to the exploitation of the recognized faction. Under the law, this does not constitute intervention in the affairs of China, so the independent provinces have no alternative to subjugation but to keep on fighting. Should they, in their extremity, seek or accept outside assistance, it becomes an illegal act, an unwarranted intervention in the internal affairs of China. The foreign Powers have set themselves up as the best judge of who to recognize and stand solidly behind the faction of its choice, while it consolidates its rule over all the others. Intervention in behalf of Nanking therefore becomes necessary, commendable and legal. In any crisis, it can call on the Powers for assistance. That is the law as applied to what is known as " China" a law that can only be enforced by the sword, a law that Manchoukuo, North China, Shansi and the South-west have rebelled against.

In response to Nanking's appeal, the American and British Governments have agreed to make separate representations to Tokyo and Nanking against further evasions of the Chinese customs laws which are injuring legitimate British and American trade in North China, and, what is much more important, diminishing China's customs revenues and impairing the value of the sole security for the payment of interest on foreign loans. Both Governments have expressed the hope that Tokyo would bring pressure to bear on the *Manchoukuo authorities* to curb the smuggling. Tokyo has replied that it was up to China to enforce its custom regulations, while China pleads inability to put a stop to smuggling by armed resistance, " for fear that she would become involved in a conflict with Japan ! "

The situation is not unlike that which confronted the United States in its earlier relations with Mexico, with the sole difference that Mexico had no powerful European friends to intervene in her behalf and compel American respect for her customs laws. Under Spanish rule, Mexico had been virtually closed to foreign commerce and the enthusiastic support given to the cause of Mexican independence in the United States had been inspired by the prospect of the termination of this monopoly and the further hope that the lion's share of the profitable trade with Mexico would fall to the merchants of the United States. But Mexico, like China to-day, was suspicious of her powerful next-door neighbor and after obtaining its independence lost no time in imposing high tariffs and complicated customs regulations to check American domination of her trade.

The American Method

Under the Spanish monopoly, smuggling from the United States into Mexico had been developed into a high art and during the war for independence had been encouraged by local Mexican officials (Just like Canton who encouraged the smuggling of American arsenal equipment when it declared its independence of Peking). It was only natural that a renewal of restrictions on trade and commerce should bring about a revival of the practice. This incited the Mexican government to more rigorous measures in the enforcement of its customs laws, especially as against American traders, who high-handedly refused to obey these laws while in Mexican jurisdiction. The Mexicans were exceedingly rigid in the enforcement of their code and this fact encouraged contraband trade, which, in turn, made the Mexicans more uncompromising in exacting and enforcing penalties. To the practice of the United States of bringing pressure upon Mexico for the settlement of claims arising largely out of these smuggling operations, confiscation of cargoes and oppressive fines on shipping, is traceable the animosities which led to the war which separated Mexico from an empire which is now merged into our Great South-west.

The Monroe Doctrine prohibited any outside interference. It is somewhat different with China, where we have erected into international law a doctrine assuring its independence no matter how far she may assert her sovereignty by raising customs duties and imposing restrictive regulations. Like Mexico, no sooner had China been recognized as a sovereign state and conceded full tariff autonomy, than it began to raise its duties progressively to all that the traffic would bear. And the proceeds of these oppressive imposts on foreign trade, instead of being set aside to pay even in part her defaulted and repudiated foreign debts, were allocated as security for a series of domestic loans aggregating over a billion dollars to pay for wars of unification and the maintenance of huge armies. *Like Mexico, China started out to cripple her next-door* powerful neighbor. In the case of China, she began by " severing economic relations," imposing boycotts, discriminating in railway tariffs on Japanese cotton yarns and textiles, tariff increases to hit Japanese products and other so-called " pacific measures " calculated to strengthen China's diplomacy and compel acceptance of her viewpoint.

There was no redress. The Chinese Government disclaimed all responsibility. Even when the terrorist gangs who confiscated and destroyed Japanese merchandise, picketed and prevented the unloading of Japanese ships, broke into warehouses, carted away Japanese cargoes and imposed their own penalties on those who handled Japanese products, were arrested and haled before the courts, the Chinese judges absolved them of any violation of the law. Shop windows, telegraph poles, sidewalks and hoardings were plastered with scurrilous and indecent posters, inciting the masses to rise and drive out the " Island Dwarfs." It was great fun while it lasted, just an outburst of genuine patriotic fervor which the " Chinese authorities could not control."

Protected by the Covenant, the Nine Power Treaty and the Peace Pact, the Chinese Government was in an impregnable legal position. Under cover of the post-war peace machinery, it deliberately went to war within the pacts to ruin Japan financially and overthrow its government. The result was a repetition of what happened to Mexico under similar provocation. She lost an empire. Instead however, of annexing the territory, like the United States, Japan recognized the independence and sovereignty of a Manchu Empire.

To the necessity for more and more funds to maintain at all hazards the armed supremacy upon which its right to rule solely rests, Nanking was forced progressively to raise its customs duties to the point where smuggling became highly profitable. It was all to the good for foreign firms when these Chinese war measures transferred Japanese business into their order books. There was no great outcry against this abuse of sanctions which had been set aside in the Covenant as the ultimate weapon of the League to enforce its mandates. American and British newspapers were loud in praise of the use of this weapon against Japan while Geneva confirmed China's right to usurp its authority and apply its sanctions. China's right to wage an economic war within the pacts was upheld by world opinion. The promulgation of the Stimson Doctrine, the verdict of the League and the thinly veiled threat that it would in due course chastise Japan, while China is coddled and accepted as a First Class Power of Ambassadorial rank, claiming a seat on the permanent Council of the League, would seem to have only one interpretation.

The Situation that Japan Faces

As the result of China's taking the law into her own hands, refusing to enter into direct negotiations with Japan for an amicable compounding of their difficulties, throwing her case into the League and demanding the application of sanctions which would have plunged the whole world into war, Japan is now outside the Family of Nations, burdened with the expense of huge armaments, facing an alarming situation along all the Manchoukuo-Soviet-Mongolia-North China borders and a still more disquieting outlook in the Pacific arising from her refusal to remain in an inferior naval status. Owing to the Stimson Doctrine, foreign financial markets are hermetically closed against the flotation of any new Japanese loans. Her markets are being circumscribed and cut off. There is no sign of any softening on the part of the boycotting Powers.

The undeclared economic war that China so blithely launched against Japan within the pacts, is still going on. In her efforts to penalize and bankrupt Japan by the imposition of high tariffs and harsh customs regulations, China overreached herself and created the opportunity for smuggling on an enormous scale. That Koreans and Japanese in the North, working in collusion with Chinese, are taking every advantage of this situation is not only natural but almost a case of poetic justice. Certainly, the Japanese Government is not obligated to follow up every shipment of goods legally inscribed in export manifests to their ultimate destination, any more than the British Government could be held responsible for the huge cargoes of liquors exported to destinations in close proximity to the United States during the bootlegging days of Prohibition.

When we view the picture in the light of what Japan has had to suffer from the Kuomintang initiative in " severing economic relations " in the hope of ruining and forcing her to accept Nanking's viewpoint ; when we consider the position of an isolated and almost friendless Japan staggering under the burden of back-breaking taxation to maintain the armaments upon which her very existence now depends ; when we look back to the time when China's boycotts against Japanese goods handed over her trade to American and British firms and the Chinese Government disclaimed all responsibility, it requires a boldness and assumption of infallibility at this juncture for other nations to direct protests to hold Japanese Government responsible for the evasion of Chinese customs regulations.

Heads We Win ; Tails You Lose

Boycotts instigated and engineered by agents of the Chinese Government resulting in the ruin of hundreds of Japanese trading firms, loss of trade running into hundreds of millions of yen, paralyzation of Japanese shipping lines, closing down of Japanese industrial plants in China, all deliberately planned and carried out for the avowed purpose of forcing financial difficulties on the Japanese Treasury and hastening the collapse of the Japanese Government, were legitimate weapons when wielded by China.

How the world would have guffawed had Japan at any time during that period notified its foreign bond-holders that their interest payments might be delayed because of the drain on its revenues and resources arising from China's " severance of economic relations." How the American, British and Chinese press would have screamed with delight at this proof that Japan was feeling the effect of this pacific war ; and encouraged Nanking to go the limit ! This deliberate stroke of Chinese governmental policy, and the evasive answers of Nanking to Japan's diplomatic protests, could not be construed as " connivance in this shoddy swindle " to ruin Japan. It was diverting Japanese trade into other channels, and therefore praiseworthy and legitimate.

Now, when the shoe is on the other foot, and the Chinese Treasury stands to lose a considerable share of its customs revenues through similar irregular activities, it becomes an international question, with questions being asked in the House of Commons. The same high Chinese officials who swung the boycott club over Japan now charge Japan with being responsible for the situation in North China. The Japanese Government disclaims responsibility. The situation becomes identical with that when the Chinese Government refused to accept responsibility for the acts of its terrorist gangs who brazenly and openly waged war on Japan and were absolved of all wrongdoing by Chinese judges, and acclaimed as patriots by more than one foreign newspaper.

The only difference lies in the fact that where American and British trade prospered at the expense of Japan as the result of these illegal boycotts, legitimate British and American trade is now being hit by these smuggling operations and the loss of customs income is allegedly impairing the ability of the Chinese Government to meet its foreign obligations secured on these revenues. There was no remonstrance when Nanking employed these customs revenues to secure issue after issue of domestic loans. Having exhausted all other assets and with the customs goose squawking and refusing to lay further golden eggs at the word of command, Nanking was confronted with the urgent necessity of finding new sources of revenue to prosecute its wars of unification. So it established an opium monopoly. It is true that all the independent war-lords and provinces, deprived by the treaties of their just share of national revenues which flowed in to the recognized faction, had enforced the growing of opium as the only means of raising money to pay for the upkeep of their armies. But the National Government of the Republic of China, recognized by the Powers as representative of the whole to conserve some semblance of diplomatic relations and continuity of treaty responsibility, was in no position to flout its obligations.

Just as the Indian Government, in conformity with the Opium Treaty, was bringing to a successful conclusion a ten year program for reducing opium cultivation to a minimum and terminating exports of the drug for other than medical purposes, thereby sacrificing revenues of over £3,000,000 or ($45,000,000 silver) Nanking scraps the opium treaty and establishes a monopoly from which it extracts about the same revenues that the Indian Government surrendered to live up to its treaties ! The same amount of opium revenues are collected by the independent war-lords and provinces. The total is variously estimated at from $80,000,000 to $100,000,000.

A Delicate Subject

For many years, the opium smuggling racket in Shanghai was controlled by a gang having its headquarters in the French Concession from whose safe precincts it defied all law and authority. The racket brought in millions and the Big Shots became so politically powerful that they constituted the invisible government of the port. Naturally, an entrenched criminal organization, more than a match for the authorities, would have to be either ruthlessly suppressed or taken care of liberally by the Government before it could hope to muscle in on the spoils. As it is the custom in China to take over bandit armies and their chiefs into the government forces, it is not difficult to believe what is now openly stated as a fact, that the opium revenues have been set aside in a fair proportion for the upkeep of a terrorist gang which came into being three years ago simultaneous with the establishment of the opium monopoly.

The Blue Shirts are described as Chiang Kai-shek's secret Blood-Brothers, the OGPU of China, wielding absolute power of life and death, in charge of censorship, direction of the Tangpus and all anti-Japanese movements. Mr. Wilbur Burton writing in the May issue of *Asia* magazine, says :

> " All active Blueshirt workers receive subsidies ranging from a few dollars a month to as high as two hundred dollars, Chinese currency. The funds to support them are believed to be derived largely, if not entirely, from the opium monopoly."

Here we have the most powerful secret organization in China with ramifications all over the country, charged with carrying out political assassinations and instigating anti-Japanese riots, maintained by Government funds derived *largely, if not entirely*, from an opium monopoly imposed in violation of treaties! Not a peep has been heard out of the missionaries and uplifters who labored so hard and so long to put an end to opium smoking in China. The kind-hearted and trustful British even indirectly transferred over forty millions of their Indian revenues to Nanking without a murmur. But when Chiang Kai-shek overreached himself and made possible profitable smuggling on a large scale and he ran crying to Britain and the United States, protesting that he could not pay his interest instalments on foreign loans because goods are being smuggled into his bailiwick to an extent that it was depriving him of twenty to one hundred millions a year in customs revenues, it becomes highly immoral, contrary to international law and a violation of treaties, calling for concerted action on the part of all interested Powers!

So Great Britain, who made no audible protest when Nanking violated a treaty to uphold which India surrendered revenues totalling £3,500,000 annually, gets all excited when smuggling of Japanese goods into China cuts Chiang's revenues some £1,500,000! The loss of a few million pounds in the budget of India can be made up by additional taxation on the lowly ryot, while the impairment of a Chinese gilt-edged security on which foreign-bondholders expect regular returns on due dates, is something altogether different. Of course, the British Government will protest, and the good old U.S.A. will rally around even though there are no American loans secured on the Chinese Customs or for that matter any other security worth a whoop.

Close Co-Operation in China

Close Anglo-American co-operation in China supplementing action already taken at London and Washington is revealed in recent almost identical cablegrams dispatched from Shanghai by the British Chamber of Commerce and by the American Chamber of Commerce. Both of these messages, the one to London, and the other to Washington, strongly condemn the acts of Japanese subjects said to be involved in smuggling activities, and openly accuse the Japanese Military of aiding and abetting the smugglers with a view to destroying the economic structure of the Chinese Government. News of the action taken jointly by the American and British Chambers was withheld in China at the time the cablegrams were dispatched and only leaked back to newspapers in China in news reports from London after the British Chamber cablegram had arrived there. The text of the cablegram that was sent to London from Shanghai by the British Chamber of Commerce reads:

> "Smuggling North China has assumed enormous proportions Lost revenue April Tientsin, Chinwangtao estimated eight to ten millions and unless steps taken enable Chinese preventive service function monthly loss revenue liable increase. Position seriously jeopardizing foreign loans and obligations secured Customs and distribution smuggled goods seriously affecting legitimate trade throughout country. Smugglers are Japanese subjects and receive support from Japanese military. Danger of wrecking China's finance and commerce due to assumed deliberate intention Japanese military achieve this objective."

The cablegram sent to Washington by the American Chamber of Commerce was addressed to the Chamber of Commerce of the United States. The text of this message reads:

> "Smuggling by Japanese subjects North China increased to tremendous volume stop lost revenue April Tientsin Chinwangtao estimated eight to ten millions and unless steps taken enable customs preventive service function monthly loss revenue liable increase stop position seriously jeopardizing foreign loans and obligations secured customs and distribution smuggled goods seriously affecting legitimate trade throughout country stop request wide publicity given dangers wrecking China finance and commerce and fact Japanese government authorities taken no steps prevent smuggling and show no apparent intention to do so."

It was seen that on receipt of the foregoing message at Washington swift action was taken by the officials of the United States Chamber of Commerce who at once submitted the charges and complaints of the American Chamber of Commerce at Shanghai to the Department of State. According to a United Press news dispatch from Washington this brought from the Department of State the announcement that it did not plan any further action at the present time, pending the result of a Japanese official investigation into the situation and the conclusion of Japanese-American economic conversations begun in the middle of May.

It is the same old story. Whatever China does is right. She is above or beyond the law. Whatever Japan does is wrong. The inconsistency of it all is amazing. No matter how honestly Tokyo may wish to lend its assistance to put a stop to these illegal activities, we can hardly expect it to accept responsibility or go out of its way to assist a government which broadcasts its intentions to have it out with Japan as soon as it feels strong enough to do so. We seem to lose sight of the fact that undeclared war between China and Japan is technically still in progress. Not until the League verdict is reversed, the Stimson Doctrine annulled and China and Japan brought together in direct negotiations for a settlement of outstanding issues, will there be any cessation to these conflicts which the foreign trader—and bond holder—must pay for.

What Does It All Mean?

Just what is this smuggling situation? We are told that Koreans and Chinese loaded down like truck-horses step from the trains at Shanhaikwan and when stopped by the customs officials yell bloody murder until they are rescued by the Japanese guards. Chinese junks and swift motor-boats load at Dairen and land their cargoes at points along the Shantung or East Hopei coasts. It is reported that Dairen cargoes smuggled into North China in 1934 were worth Yuan 120,000,000 and that the figure for 1935 was much higher. It is alleged that under the terms of the mysterious Tangku Truce, armed Chinese revenue cutters are prohibited from entering East Hopei territorial waters and that Chinese customs officials are not allowed on the railway premises. It is reported that the smuggled cargoes are boldly loaded into railway cars consigned to Tientsin, where they disappear promptly into the Japanese Concession to reappear in the retail shops at prices with which legitimate traders cannot compete. As a result, several important lines of foreign trade have withered away.

It is urged that Japanese consular officials when appealed to for assistance, reply that they are powerless, as smuggling is not an offense within their competence. Because of the inability of the Chinese authorities to cope with these activities it is contended that smuggling can now be stopped only with Japanese co-operation. It is admitted that the Chinese are as actively engaged in defrauding their own customs as Koreans and Japanese. Unquestionably, this must be so, as in the last analysis, the smuggled goods must reach the ultimate consumer through the medium of the Chinese retail shops.

Something of the same situation is found at La Linea in Southern Spain, just across from the free port of Gibraltar, where, despite the vigilance of the Spanish customs guards, or perhaps because of their connivance, contraband goods seep through the barriers in large quantities and find a ready sale as such in all the cities and towns of Andalucia. Spain is in no position to hold the British Government responsible for these violations of her customs laws. It is her own lookout.

What is the answer? What remedy can be applied? It may be within the competence and power of the Japanese army and consular officials to curb smuggling operations along the railway zone but as long as merchandise can be openly purchased in the free port of Dairen or any port on the Korean littoral, loaded on sailing junks and cleared for Chinese ports, the closing of the land route will merely divert the traffic to the sea and the smuggled goods will continue to enter China by the way of Shantung or even Kiangsu. If every tower along the Great Wall be transformed into a Customs station, the only effect would be to stop a few Koreans and Chinese from carrying contraband in on their backs or as luggage and hand a monopoly of the traffic over to the Chinese junkmasters and pirates. To stop this, the Chinese Government must maintain a fleet of fast revenue cutters in the Gulf of Chili and down the coast as far as Shanghai, a solution our engineering and dockyard friends will applaud.

Several Other Factors

Whatever may be the total of smuggling operations along the coasts of China, it could not be made to include payments for goods and arms entering Tibet or Hsinkiang. It might be asked; where did the Tibetans purchase their modern arms and equipment? From what quarter does Mongolia and Hsinkiang procure the same materials? Who will protect the Chinese Treasury against raids on its revenues in far-off Central Asia and the Roof of the World? These regions are deemed to be as much a part of China as Shantung and Hopei. Do we recall when the upstanding "Christian General," was receiving arms and munitions from across the Gobi desert? This same "Christian" leader is clamoring for war against Japan. From where does he hope to get his support, his arms and munitions? It is not difficult to trace the connection. Does anyone know for certain what merchandise is coming into China by this overland route at the present time?

There are other inlets and outlets to the Eldorado of Cathay, but all that foreigners seemingly are concerned with are those wickets through which Japanese, Koreans and Manchurians wander in and out at will. They seem to overlook the existence of a free and wide gate-way in South China with the Lion and the Unicorn carved deep above the propylon. Through it, one of the greatest ports in the world, pass ships of every nation trading to the Far East. Statistics on entrances and clearances, total tonnage and the flags of these vessels, are religiously compiled by the Government of that tight little British Colony, but as yet, accurate figures as to the volume, value and nature of what these argosies carry, what they load and unload, are not available. That is one piece of information the British Government cannot be coaxed or prodded into releasing.

As a large percentage of all foreign goods destined for the Chinese market is unloaded at Hongkong for reshipment to South China and Coast Ports, it has become a settled policy of the British Government and the British-directed Chinese Custom Service, to list all these imports in the Customs returns of trade, as proceeding from Hongkong, that is, as British. In that manner, goods of all countries unloaded and transhipped at Hongkong swell the British total and eliminate the possibility that a subject of any other nation will head the Chinese Customs Service, until the direct trade of his country with China overcomes this handicap. For that reason also, it is difficult, with any degree of accuracy, for other nations to estimate the volume and value of their trade with China passing through the port of Hongkong. They can check on what they export direct to Hongkong from the ship's manifests, but what proportion is then reshipped, is more or less guess-work.

Despite the fact that Bias Bay is only a few leagues distant, that the Pearl River Delta swarms with pirates and *contrabandistas*, that the Chinese Government maintains a large fleet of customs cruisers in these waters to suppress their activities, no censure or blame for such conditions fall on the Government or the staid and ultra-respectable British hongs in the Colony. With the rayons, sugars and high-dutiable goods of every country in the world flowing through the free port of Hongkong, located in the very center of the most lawless community in Eastern Asia, there is no suggestion that some of these goods might be entering China illegally. There have been occasional reports in the past that smuggling does take place in these regions, and we recall on several occasions that the Chinese Government complained and requested permission for its revenue cutters to enter Colonial waters when chasing pirates or contrabandistas. Everything was nicely arranged at a conference between the Governor of this British colony and the British Inspector General of the Chinese customs. *There is no smuggling out of Hongkong.* Positively not!

Mere Possibilities Only

There is another large orifice north of Tonkin with a narrow-gauge Decauville railway terminating at the Kwangsi border and another longer and more important line reaching way up into Yunnan, all under exclusive French control. The French do not manufacture rayon or other high-duty luxuries that encourage smuggling. Nor do they manufacture arms and munitions that could be sold to the Kwangsi and Yunnan war-lords. And if they did, the French Government, would place every obstacle in the way of defrauding its great and good friends at Nanking of their revenue.

Only the Northern Chinese and their Korean cousins are capable of evading the payment of customs duties. Attention is centered on their activities for the reason that being in closer contact with that other free port and Leased Territory under the Flag of the Rising Sun at Dairen, they confine their merchandizing exclusively to the goods nearest at hand and slip them through the lossely guarded doors of the North. This is a very grave crime against international morality and must be stopped. The smuggling monopoly will then be transferred to those good little Bias Bay Boys in the South who stock up in Hongkong, or load their junks in Formosa, in the Philippines, in Indo-China, Siam or points South.

Bias Bay has made a reputation for itself, but its piratical crews are only neophytes in cussedness compared to their colleagues of the Tonkin Gulf or those gentle bandits of Kwangsi, who not so many years ago, indulged in their favorite pastime of flaying alive any French legionaire who wandered across the border from Tonkin way. All this is past. There is no more lawlessness in these regions. The conscientious, law-upholding French authorities in Indo-China can be relied upon to keep the open door open in South-west China in the same splendid manner that in the past has characterized their scrupulous respect for the high principles of equal opportunity on the Yunnan Railway. *There is no smuggling out of Indo-China.* Mais, No! Monsieur!

It would be libellous to suggest that the enterprising Sons of Tang operating their tramp steamships to the South Seas and back and forth between South China and Philippine ports, or that those Bias Bay or Tonkin Gulf sports might load up with American goods on the coasts of Luzon and defraud their beloved Chekiang ruler out of revenues so desperately required to purchase aeroplanes to be used in enforcing submission to his rule. Again, no reputable American merchant in Manila knowing what a deep, kindly interest his government takes in China, would sell a bill of rayon or other goods on which Nanking levies 200 per cent duties, unless he had a written guarantee as to the ultimate destination of the merchandise. And those Cantonese merchants who practically control the retail trade of the Philippines in partnership with their brothers in South China are so loyal to Nanking and so enthusiastic for the ultimate success of the Chekiang Group who stole their triumph in 1927, that they would immediately denounce to the Authorities any of their clan who might try to cheat Nanking out of its lawful perquisites. *There is no smuggling out of the Philippines*, Seguramente que no. Senor!

The port of Swatow in South China is notorious for smuggling in all kinds of foreign goods. There are reported to be about forty Chinese houses in the port specializing in smuggling such commodities as rice, cotton yarn, cotton cloth, rayon and miscellaneous goods from Formosa. But those Hakka boys are under the jurisdiction of the South-western Independent Government and their operations are just a little outside the jurisdiction and competence of the Nanking authorities. What is transpiring in North China is being duplicated in South China but for the moment, on a less spectacular scale. There are no Japanese railways or Free Ports in South China, but the nearby coasts of Formosa, Indo-China, Luzon and the Free Port of Hongkong are just as good, if not better places, to load up the junks with choice dutiable goods.

Just A Few Comparisons

By a process of elimination, we find that the only people capable of defrauding Nanking are those Northern Chinese and Koreans —and, of course, the Japanese—who stock up in Dairen and slip their merchandise through the Customs cordon of the North. Collective action is suggested to do something no other nation has ever accomplished or been called upon to do—protect the customs revenues of another nation.

When we recall the huge expense to which the American Government was put, to stop smuggling during the hectic days of Prohibition, how the profits from these illegal activities ran into astronomical figures and covered the land with organized gangs of criminals who practically dominated and dictated the law in their respective territories, it becomes somewhat farcical for a Government which cannot enforce its own laws to protest against conditions in another part of the world which create similar opportunities and incentives for wrongdoing.

Mr. J. Edgar Hoover, Director of the Federal Bureau of Investigation tells the people of the United States that their annual crime bill is fifteen billion dollars, that the underworld army numbers more than three million active participants, that last year there were 12,000 murders and 1,445,000 major crimes! He warns us that unless we get up and fight this menace, we must make up our mind to submit to what amounts to an actual armed invasion of America. Which means chaos, anarchy and the overthrow of decent, orderly government. In other words, the complete Chinafication of the United States with a bandit oligarchy holding the people in subjection by machine-gun terrorism. In view of what Mr. Hoover has to say to the people of the United States and what Mr. Hull has to say to Japan over a picayune smuggling racket in China, we confess to an inability to properly express in fitting language our thoughts. A Government admittedly powerless to protect its own citizens against organized crime which extracts from its victims three times what they pay in taxes, is somewhat handicapped in posing as the judge of another nation's morals.

We might go a little further. There are no criminal gangs in Japan, no racketeers or mobs who prey on the people and small shopkeepers. There are no professional gun-men, "typewriter" experts, no assassins for hire who guarantee a "clean job." There are no opium dens, no organized smuggling rings. In fact, it may fairly be said that the Japanese know nothing about organized crime. The most popular and most profitable American films shown in Japan are those of the gangster type and from the number and variety depicting crime in all its aspects and ramifications that have come under our personal observation, they are receiving a liberal education in cussedness. They are great imitators, these Japanese and maybe they are trying out some of these Western methods where they think they can get away with it safely. Who knows?

Why not squarely face the fact that the recognized Chinese Government is incompetent to maintain law and order either ashore, on its rivers or in its costal waters. No Government in China has ever been able to suppress piracy or smuggling. The whole history of modern China is interwoven with opium smuggling and the measures taken to enforce the Imperial edicts prohibiting its importation. The principal reason for the presence of foreign war fleets in Chinese waters is to keep the sea-lanes open against pirates. If it was not for the occasional aid extended by the exasperated British naval authorities in Hongkong, Bias Bay would long ago have set up as a piratical state like its 19th century counterparts along the old Barbary Coast, taking toll of every foreign ship and native junk navigating the South China Seas. If the combined Chinese navy, coast guard and revenue services, supported at times by American, British and French gun-boats and river patrols have been unable for over a century to suppress this scourge of the China Coast and its navigable rivers, it goes without saying that Nanking of its own initiative, will never put down smuggling or piracy in North China waters.

So we proceed towards another diplomatic showdown. Nanking has picked up enough courage to file a protest with Tokyo against smuggling in North China and the *Hochi's* correspondent in Shanghai says that it was instigated by Great Britain, the United States, France and Germany and, that Sir Francis Leith-Ross had a hand in it. He adds that anti-Japanese feeling in China is likely to grow. Sure it will grow. When Nanking finds itself supported by such powerful influences, anti-Japanese feeling is bound to grow and break out in violent measures.

A Conflict of Testimony

As a counterblast to Nanking's protests, however, we have the emphatic statement of Mr. Yin Ju-keng, Administrator of the East Hopei Autonomous Government, refuting allegations that the inflow of contraband goods had been intensified since the establishment of his regime. **"No contraband goods are allowed to enter the area under his jurisdiction,"** he declared, and **"so strict is the surveillance by the local police that it is almost impossible for anyone to dare to smuggle anything past the coast."** Mr. Yin, characterizes Chiang Kai-shek's policy of high tariffs "as a measure to exploit the masses," placing upon him full responsibility for the smuggling that is going on all over China.

In this conflict of testimony, of law, of interests, of profits, the foreign Powers insist upon making bad matters worse by supporting one side against the other, instead of crying a halt and urging China to settle her differences with Japan in the only way they can be settled short of war. Suppose China loses something? **"What China loses to-day she will take back when she has the strength."**

It is the height of folly to encourage Nanking in a policy that can result only in further humiliations before she has engendered a national spirit that will carry her through a crisis such as would follow another showdown with Japan. In the meantime, the interests of legitimate American, British, French, German and Japanese traders and bond-holders are suffering, because no one has the courage or the common-sense to insist upon some immediate compounding of these disputes in an amicable manner before another explosion occurs. Diplomatic pressure upon Japan over smuggling, accompanied by protests, notes and editorial fulminations, will have no more effect than the condemnation of Geneva. Such measures will only tend to drive her deeper into her shell and convince her that she has little to expect from a West determined to side with China and uphold her in every transgression of the law.

But the undeclared war goes merrily on. The United States signs a silver agreement with Nanking, which, after everything else is said, is no different from the cotton and wheat loan advanced to strengthen China against Japan. The British, annoyed at this interference with their plans to link the yuan with the pound sterling, are consolidating their hold over various railway and other industrial undertakings. The Chinese press is again full of talk about joint British and American assistance to China. Italy is negotiating with Nanking for the sale of forty more bombing planes and replacement of American aviation advisers by Italian aces. God only knows what secret agreement exists between Nanking and Moscow. This much is certain. The Red Far Eastern Army is now vastly superior to Japan's standing force. It is instigating trouble all along the Manchoukuo and Mongolian borders, while Chiang Kai-shek's divisions are being gradually moved into North China where, at a given moment, they can co-operate with the Soviets.

On top of all this, President Roosevelt suddenly imposes higher rates of duties on Japanese cotton textiles. The Australian Government announces its intention to raise the tariff on silk and cotton goods. At the annual reunion of the Opium Board at Geneva, official propaganda is, as usual, directed against Japan. Public opinion throughout the world is not permitted to forget for a minute that Japan is outside the law. The blackening of her character goes on unrelentlessly. While Premier Hirota declares before the Diet that there is no fundamental anti-Japanese sentiment in China, the Blue Shirts are instigating new anti-Japanese demonstrations and boycotts. Deep down in their hearts the Chinese are bitter. They are preparing for trouble: Compulsory military training is being given to all school children to prepare them for the grand effort against the traditional enemy. They are jubilant over immediate prospects. On all sides they see a determination of the Powers to combine against and punish Japan. They still believe that international action can be forced. The situation is highly explosive.

Forcing A Showdown

The only cement that holds fissiparous old China into any sort of a recognizable whole is the foreign controlled customs presided over by a Knight of the British Empire. And he is working like a Trojan to hold the parts together. Supported by this display of moral and diplomatic reinforcement, Nanking is forcing a showdown. The Japanese are preparing to meet it. Fresh divisions are pouring into Manchoukuo while another force is embarking to strengthen the garrison in North China. Japanese Army Chiefs declare in no uncertain words that the Tangku Truce must be adhered to, that smuggling or no smuggling, armed revenue cutters and customs guards will not be permitted to operate within the demilitarized zone, that the autonomous state of East Hopei which has been erected as the result of the working of this pact, must be respected and, furthermore, that the prevention of smuggling can be enforced by Nanking only within its own jurisdictional limits.

Whatever may be the terms of the Tangku Truce, the instrument is, as its name implies, a temporary cessation of hostilities, pending negotiation of a treaty of peace for the full settlement of all outstanding questions.

The uncertain and delicate situation so created is bound to occasion inconvenience and even injury to neutrals. Technically, there are no neutrals except Salvador. The hurried promulgation

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Japan's Challenge to the West

By the Rev. Dr. YUTAKA MINAKUCHI

(The author of this article, Dr. Yutaka Minakuchi, is the only Oriental pastor of an American congregation in the United States. He is a native Japanese born in the city of Okayama from which his family removed to Tokyo where he received his public education. He received his university education in American institutions including the University of North Carolina, Yale and in the Graduate School of Theology of Oberlin. He is a minister of the Congregational Brotherhood and at present is serving as the regular pastor of the Peacham Congregational Church at Peacham, Vermont.)

IT is natural for a Nipponese resident here to entertain deep regret at the tension and misunderstanding between Japan and the United States. It seems that there is a general sense of uneasiness caused by the spread of alarming accounts of Japan and her people. As a result, the American public appear to entertain numerous misgivings instead of adopting a conciliatory attitude towards a nation affected by occasional asperities incident to its national readjustment.

Dr. Yutaka Minakuchi

In this paper, the writer is not offering an apologia for Japan's decisive step taken at Geneva, nor endeavoring to defend her recent course of action in continental Asia. If such is needed official Japan herself is prepared to bear the burden. I am rather prepared here to amplify the underlying causes responsible for current widespread pathological tendencies, and would suggest a possible panacea for international discord.

To bear false witness against one's neighbor is deemed in the realm of personal morality a serious offense, but is it not possible to malign one's neighbor-nation ? Mercenary writers and crafty propagandists can inflame more lasting bitterness and ill-will, than can temporary physical assaults. To the brave and the loyal the bayonet-thrusts upon the flesh would be more welcome than the piercing of the heart by the insults of the pen.

A loyal son of Nippon would warn his own countrymen against any attempt on their part to propagate false reports concerning a country with which their own is now placed in the most important and delicate relations. Certainly this is no time for petulant irritation or national prejudices. Let it be the pride of the Japanese nation to speak without national antipathies and with utmost candor, and seek to discard its insular consciousness and cherish genuine courtesies.

The mischief, however, has already been done, to such an extent that many an American imagines Japan to be a moral pariah, and her present political isolation to be an indelible stain well merited by her international conduct. There are others whose knowledge is limited to current hearsay and newspaper headlines, and who with the illusion of prejudice freely indulge in the rash remark : "Can any good come out of Japan ?"

The writer cannot let such an appraisal pass by unchallenged. Moreover, he is bold enough to predict that those who are now sceptically inclined twards the Pacific island nation will some day repent their folly just as the Nathanael of old was obliged to recant his unfavorable opinion of Nazareth in the presence of Invincible Reality. To be sure, to face all sorts of facts with calm impartiality and to determine their significance with dispassionate judgment is one great step towards understanding the heterogeneous relations of the vast human family.

Let us go back for a moment to the time of Japan's debut into the arena of world politics and commerce, and trace briefly the emergence of modern Japan.

To use the language of Tagore—"The West in the voice of her thundering cannon had said at the door of Japan, Let there be a nation,—and there was a nation." This romantic episode of some seventy-five years ago marks the beginning of Japan's modern career. Those were, indeed, stormy days for the Island Kingdom, but inspired and moved by the instinct of self-preservation she spared no labor nor energy to weather the storm in the midst of discouraging circumstances. Under western tutelage, however, she managed to grow in the knowledge of those things for which western civilization stood and apparently remained in favor with the Christian nations of the Occident.

The seeds which the West had sown did not fall by the wayside, and so with abundant promise for a great harvest, the Island nation moved onward with astonishing rapidity. Of course, many mistakes were made during the period of transition, but on the whole the young nation was westernized in ways and manners with amazing celerity. No wonder then since this initiation, we have heard many a time the West boasting of its phenomenal success in Occidentalizing the Mikado's empire.

Then came the time when Japan had occasion to test out the efficiency of her westernized army and navy in the war with China in 1894-5. While the young nation was piling up one victory upon another, during the China and Japanese campaign the proud West relished in its heart the satisfaction of having taught the new-comer the art of modern warfare. So when Japan emerges triumphant from the Sino-Japanese conflict she was acclaimed as a new-born nation created in the likeness of the West. But the praises and applause which were so lavishly showered upon her did not replenish Japan's empty coffers nor add one inch to her moral stature ; they only served as a mere friendly gesture. Of sympathy there was abundance, no doubt, but at critical points Japan was left alone to grope her way. One thinks of the tragic ending of the Sino-Japanese war, when the well-earned fruits of Japan's victory were wrested from her by reason of the triple intervention concocted by Russia, France and Germany. Those great Powers of Europe demanded of Japan the retrocession of Liaotung in the name of peace and China's territorial integrity. Here in glaring form is a startling victory for European diplomacy backed by powerful armaments.

What did the Powers do in the course of five years that followed the tragic event ? Did they display in any way their Christian conscience in their dealings with the insulted nations of the Far East ? On the contrary, every one of the great nations of Europe managed to secure certain territorial concessions in China and Manchuria, for economic and strategic reasons. Having discovered China's weakness the great powers of Europe began to establish spheres of influence in various parts of that unfortunate vast country for no other reason than to exploit China's economic resources. Russia's ambition was, however, primarily political ; and her lease of Port Arthur and its adjacent territory meant a great diplomatic triumph in her scheme of empire building in the Far East.

In this mode, youthful modern Japan was initiated into the comity of civilized Powers through the avenue of European diplomacy. Such initiation was undreamed of so far as Japan was concerned, hence it caught her like a nightmare, endangering her national existence. Here we have a good instance of ominous sowing done by the imperialistic nations of the West before the eyes of a growing youth.

The decade which followed the tragic drama enacted at the expense of the Island Kingdom was one of the most trying periods in the annals of modern Japan. Thanks are due the far-sightedness of her able statesmen. To meet the impending crisis Japan lost no time in putting her own house in order. Making a long story short, after the lapse of ten strenuous years Japan was obliged to challenge the Muscovites in a decisive conflict which demonstrated to the world the superiority of her men and arms both on land and on sea. This was in 1904 and 1905. Let us not forget the fact, in this very connection, that the great duo-continental was really defeated by means of the very forces which Europe created.

During that titanic struggle the young nation of Japan once again enhanced her reputation, and the sympathetic Christian West elevated her to the status of a civilized Power, in whom the West herself found her own glory. Is one overstating the case ? One is, to be sure, speaking the contemporary speech and not in the language of an enlightened, humanitarian, post-war age.

Now a glance at the portentous scenes extending from the Chino-Japanese war to the Russo-Japanese conflict. Does the West find anything to be proud of ? Did not the blunders committed by the great Powers of Europe leave behind open sores whose healing has repeatedly been interrupted by their own careless handling of the bruised ? Some of the guilty nations must have repented their transgressions many a time since then, *but* so far as Japan is concerned she has forgiven, but not forgotten, the ill-calculated conduct of her tutor-nations. On the other hand, one can well imagine how the Japanese delegates to the League of Nations felt when they listened to the solemn verdict pronounced upon their Motherland by the Supreme Council regarding the Manchurian issue. I do not for a moment deny the honesty of those judges—all were honorable men who composed the League Council, but among them there were representatives of the great nations at whose hands Japan was obliged to experience stinging humiliation at the conclusion of the Sino-Japanese war in 1895. Was this action of the League Council intended to pass judgment on Japan's travails of the past decades ? The Japanese nation was apparently degraded to the level of an international outcast while Europe was exalted, in the eyes of the credulous, to the pinnacle of moral excellence. Did not some of the nations represented in the Council Chamber hear "the voice of suppressed goodness" when they were about to impose so weighty a sentence upon the very victim of their own folly ? I refer my readers to what Europe had sown on the soil of East Asia during the closing years of the last century—the numerous concessions and subdivisions and exactions and spheres of influence.

What did the Master Teacher of Galilee say to the Pharisees and scribes who brought to Him an erring woman ? "He that is without sin among you," said the Teacher, "let him first cast a stone at her." Have these words of wisdom no longer any force and effect in the realm of international politics ? Does civilization think itself so far advanced that the idealism which kept alive the spirit of progress for the past nineteen centuries has no longer any appeal for the conscience of the twentieth century ? Not so to some of us, I trust, who still cling to the spiritual efficacy of the teaching of Jesus as a moral dynamic which generates in men and nations right motives for right actions.

What the world needs to-day is not censure but sympathy, not judgment but encouragement, not definition but "a cup of cold water," not power-complex but meekness, not argument but convincing deed, not a theory of Democracy but friendly treatment, not revolution by violence but reformation through applied goodness. These are some of the virtues which we profess, and when they are found to be workable in council chamber as well as in the market place, then shall East and West work together for the realization of the world brotherhood.

For many decades Japan looked upon the United States as a Champion of benevolence. Since the days of Townsend Harris, the mere mention of America kindled in many a Japanese heart something akin to noble enthusiasm and tender veneration. As a result, the stories of heroic suffering and mighty deeds found in American history were eagerly read by Japanese youths. On the other hand, the West herself was ever ready to reciprocate friendly sentiments and feelings whenever the occasions offered. This was well demonstrated during the Sino-Japanese and the Russo-Japanese wars. When Japan emerged victorious from those death-dealing struggles the triumphant outcome in each case was extolled by the West as the glory of glories. Japan appreciated it, and she gave thanks for it many a time since then. But in celebrating Japan's victories the West unconsciously glorified the Art of War itself. One does not mean to disparage the generous attitude and friendship of those who watched crucial events with eager anticipation. While Japan's victory was praised the altruistic American public committed a grave omission. They failed to give credit to the Japanese treatment of Russian prisoners of war.

This act of humanity was tantamount to a blunder, for the primary emphasis was put in on the wrong place. By so doing, Japan unconsciously helped rekindle the dying embers of European imperialism and its concomitants. Such heedless conduct on the part of the enlightened West furnished the novice, still in her indiscriminate age, the most unwholesome food imaginable. As a result, the good which Japan had done throughout the Russo-Japanese campaign is now altogether forgotten by the West.

To make the case concrete, let me cite a few striking instances told by an American eyewitness who was a resident teacher in Japan during the Russo-Japanese conflict.

"During my five months in Matsuyama after the Russians began to arrive," writes Dr. Sydney L. Gulick, in his book entitled "White Peril in the Far East," "I heard no suggestion of jeer or taunt or scorn. Even in talking about the Russians such sentiments did not appear. Rather was there evidence of pity for them, with a desire to help them."

"Take it all in all," he writes, "the treatment of, and feeling towards, those prisoners both by the government and by the people was as nearly ideal as possible." "So much did the prisoners themselves appreciate the good will of the people that a group of them wrote an appeal to the Emperor, beseeching that when the end of the war should come and the prisoners should be set free, they might be allowed to remain in Japan and become his subjects."

These words of one who actually saw what was taking place there, should convince the reader of the benign nature of the Japanese people.

Furthermore, Dr. Gulick tells us elsewhere that the first prisoners brought to Matsuyama were received as "guests" and that special quarters were fitted up for them after the European fashion and that even European foods were provided for the men. To make their stay more like home, fresh-cut flowers were provided for their rooms every few days. "Regular visits of condolence were made by the Governor, Vice-Governor, Chief of Police and heads of villages. The Emperor sent special word of consolation and asked them to make known their wants."

To show further consideration for her enemy-soldiers during the earlier Manchurian campaign, the Japanese soldiers used a particular variety of bullet and powder and small caliber guns in order to avoid any unnecessary fatality. One of the leading army surgeons told Dr. Gulick with pride that "of 600 Russian wounded that he handled, only six proved fatal."

On the other hand, some of us have not forgotten the cruelties and atrocities practised by Russian soldiers on Japanese scouts and soldiers as they lay wounded on the battlefield. It is too ghastly a story to repeat; perhaps the less said about it the better. One wonders if the communists under the Soviet Union, including the high ranking officials, are more humanely inclined towards their fellow-beings than those of the Czarist Russia? What do present facts indicate?

Was the humane treatment of Japan's enemy-prisoners Christian or pagan, Occidental or Oriental? And yet, Christianity in those days was understood comparatively by a limited few, while the majority of us were, then, either Buddhists or Shintoists or both. Are we willing to admit then that such extraordinary conduct on the part of the Japanese people must have been an expression of deep-seated character?

At this juncture, some of our readers, to be sure, may contend that what she was thirty years ago is no proof for what she is to-day, and that her recent aggressive course in China and Manchuria offers ample evidence that she has lost her former virtues. Admitting that we are living in a fast changing world, is it reasonable for us to suppose that within a few decades a nation's inherent characteristics, moral, mental and social, can in any radical degree be changed?

To superficial observers such a query may convey no significance, but to those who have some knowledge of the thousands of years of Japanese culture and civilization it must offer food for serious thought. On the surface Japan's action in China did appear wanton and aggressive, but how about the underlying reasons and motives? How many of us have taken pains to penetrate and rake to the bottom of the troublous waters?

In this inductive age when one depends so much on current news report for our common knowledge, one is apt to lose sight of the actual meaning of international problems. This is especially true with respect to the Far Eastern situation, which can only be understood through the perspective of history.

To believe that Japan has been degraded as a nation to the level of a moral pariah is a superficial defence against deeper insights. Very often those who are down on Japan are not familiar with things Japanese. On the other hand, the critical minded may assert without mental reservation that Japan's recent action in Eastern Asia is nothing more nor less than reaping what Europe had been sowing during all these years, and that the time has come at last for a youthful nation, whom the West has created in her own image, to exemplify some of the lessons which she had learned in the school of European diplomacy.

Not many weeks ago, the writer was invited to speak on matters concerning the Far East, to a large organization of women in the vicinity of Boston. After the address a half dozen or more members came forward and spoke in this wise: "You must remember that this is an enlightened age of the twentieth century, which does not believe in old-time exploitation, and the like." Whereupon I asked them if they thought the present century was so far removed from the previous one in conceptual make-up that the overpowering trend of imperialism of the nineteenth universally appeared obnoxious to-day? I then called their attention to the fact that the most ruinous war was fought only twenty years ago; that the great nations of the world are more loaded down with armaments to-day than ever before; that our ears are almost drowned with the din of war-rumors every day; that, if anything, there is more suspicion prevalent in the world to-day than there was in the nineteenth century; that we hear more about heinous crimes being committed in this civilized West than ever before, and that we are now face to face with a great economic calamity which has thrown many millions out of legitimate employment. If these are the external symptoms of the inner mood of this century we have nothing to boast of to-day when compared with the tenor of the preceding century.

To steer this world of ours out of its present dilemma and restore it to the confidence of the peoples, there must be creative statesmanship capable of drawing together all men "belonging to different climates, habits and languages, not in the clash of arms, not in the conflict of exploitation, but in harmony of life, in amity and peace." Where shall we then look for such a panacea for the current international ills?

Shall we turn to Geneva for the remedy? Without doubt the League of Nations has the machinery for peace. But can it give us permanent peace for which the world is yearning? To act merely as a preventive gainst bellicose propensities, is not a function to be laughed at, to be sure, but that alone will not make for peace. The League of Nations may grind out a machine-made peace from time to time through its various concoctions, but such peace will not endure for long. Possessing no spontaneous character, it is bound to disappear whenever the machinery itself suffers a partial dislocation.

Is the League of Nations built upon the fundamental idea of human unity for the consummation of Common Weal or upon a combination of various interests for the enjoyment of material security? If the latter be the case, no abiding peace will ever come out of it; while if the former platform is sound in itself, the League as it is shows no semblance to it, for it emphatically disavows the idea of racial equality.

What is Peace, after all is said and done? Let us listen to that poet-sage, Tagore, as he sings it! "Come, Peace, thou daughter of God's own great suffering." Just so! That is Peace, indeed. To bring out the cadences and harmonies that are each nation's birthright, all nations of the world should join in the grand chorus when Peace is being sung. Instead of a babel of confusion and discord, all voices produce concord and harmony, with the will to combine. But no artificial combination of Principalities and Powers, however mechanically perfect, will ever comprehend Peace—much less approach it, if bound by selfish advantage and shrewd arrangements.

To be possessed of peace, every nation under the sun must be a cross-bearer. Curb our sheer ambitions and greed we must, as also bear the burdens of our humanity without murmur, as a necessary step towards compensating God's great suffering out of which Peace is born. One act of genuine kindness does more towards Peace and human unity than any number of temporary contrivances ordained for an artificial rapprochement. Let me illustrate this point.

Amid the confusions and tumult of chaos caused by the calamitous earthquake of 1923, Tokyo City was placed under martial law. In spite of rigid control by military and police authorities, many unscrupulous individuals became involved in various misdemeanors. Among them were found some Korean students. According to press reports they were arrested for political intrigue. This seemingly austere treatment of the Koreans by the authorities roused resentment among the Korean population of the city. As the result, the Koreans announced an indignation meeting to be held in the Metropolitan Y.M.C.A. The meeting was intended as a protest against the government authorities on behalf of the accused. Meantime, another group of Koreans encountered similar difficulties. This group, however, attempted to offer resistance by force and made the situation worse. Whereupon the guards with bayonets went after the offenders in earnest. Just at this crucial moment there appeared an elderly Japanese lady who was no other than the boarding-house proprietress, under whose hospitable roof dwelt the accused Koreans. Without a word of warning, the lady threw herself between the prisoners-to-be and bayonets, and facing the military guards she uttered the warning, calm but resolute: "Before you kill these Koreans you shall put me to death, for these are innocent youths." You can guess the rest. The old lady saved the day for the Koreans.

But how about the mass meeting which was to be held in the City Y M C.A.? News travels faster than one thinks sometimes, so the name of the woman-savior reached the hall where the meeting was about to convene. The chairman called the meeting to order, and told the story, and the whole audience voluntarily rose to its feet in appreciation of the saving deed done by the Japanese lady, and the meeting was then adjourned. No Korean student went out of the building with a shady sentiment that night.

My readers, there is still in the heart of the Japanese nation much latent goodness waiting to be called forth. Give this a chance for self-expression, and she will gladly meet you more than half way in settling any misunderstanding. Crown her with kind deeds and with kinder deeds she shall recompense you. Japan's friendship may be of but little moment to you now, but no one can tell for certain what will be the morrow's destiny. The proudest empires come and go, and no nation wears misfortune-proof garments. I, for one, do not anticipate a day of reverse for any one—much less for America—but if such a day does overtake any of us, may we not have to look back with regret at our premature judgment in rejecting a nation whom we might have embraced as a friend.

Is the West, then, ready to attune the harp-strings of Peace to strike out the concord of world harmony which will supplant existing international discord?

Japan's Products and Her Raw Materials

JAPAN has long ceased to be satisfied with her spectacular progress as a country of textiles and other " light " industries. While the eyes of her foreign competitors are fixed upon the rising tide of Japanese exports of cheap manufactures, Japan's industrial ambitions, says the Tokyo correspondent of the *Financial News*, have turned to iron and steel.

Quite recently serious foreign observers were convinced that the almost complete lack of iron ore and cokeable coal would make it impossible for Japan to build up an extensive heavy industry. They have had to revise their judgment, Japan's political " will to power " has been stronger than her material deficiencies. She is to-day well on the way to building up a formidable iron and steel industry, which, though still dependent on imported ore, scrap-iron and coal, is even now capable of supplying the whole of Japan's need for pig-iron and steel.

Steel consumption, both for industrial and military purposes, has greatly expanded. Taking the annual steel consumption in 1914=100, it had risen to 225 in 1919. The Washington Naval Treaty and the trade depression held up the advance for a time. In 1931, when the " Manchurian Incident " and the abandonment of the gold standard initiated the twofold boom in the armaments and exporting industries, steel consumption was only at 250. Since then, however, it has increased month by month, and the figure for 1935 reached 550.

During this period of expanding demand for steel, Japan's dependence on steel imports from abroad has steadily diminished.

In 1920 the total consumption of steel amounted to 1,570,000 tons, of which 530,000 tons were produced at home and 1,040,000 tons were imported from abroad. In 1931, when consumption had only slightly risen to 1,930,000 tons, no less than 1,660,000 tons were produced at home and only 270,000 tons had to be imported. In 1934, with a record steel consumption of 3,580,000 tons, home production had reached 3,230,000 tons, while imports amounted to 350,000 tons.

It was estimated that in 1935 the total supply will be approximately 3,900,000 tons, of which at least 3,450,000 tons will be produced in Japan. For the next two years a further annual increase of steel production by at least 100,000 tons is expected, and it can be confidently predicted that by 1937 Japan will have no need for any substantial imports of steel.

Pig-Iron Output

Pig-iron, the chief raw material of the steel industry, is also increasingly produced in Japan. In 1920 the total consumption of pig-iron was 910,000 tons ; Japan produced only 520,000 tons herself, while 80,000 tons were received from her own works in Manchuria, and the rest was imported from other countries.

In 1931, when consumption had risen to 1,410,000 tons, Japan already made 920,000 tons at home and obtained 330,000 tons from her Manchurian plants, so that imports from other countries were negligible. In 1934, with a supply of 2,600,000 tons, nearly 2,200,000 tons where made in Japan, and the remaining 400,000 tons came from Manchuria.

In 1935 the demand for pig-iron is expected to rise to 3,100,000 tons, of which Japan will produce some 2,150,000 tons and Manchoukuo 350,000 tons, while this time 600,000 tons will have to be imported from abroad.

British India, the most important supplier of pig-iron to Japan, has already received orders for some 200,000 tons for delivery during the first half of the year. Manchurian deliveries are expected to decline during the next few years, because that country is expanding her own steel production. Nevertheless, Japan hopes to be practically self-sufficient in regard to pig-iron as well as steel by 1937.

The snag in all these calculations is, of course, Japan's lack of resources of suitable iron ore. Even during the recent boom years no more than 300,000 tons of ore were raised in the country. This ore, moreover, has an average iron content of only 30 per cent ; and on account of heavy chemical impurities the cost of production is unduly high. In any case, the reserves are limited. There are considerably larger iron ore deposits in Manchuria, but their quality is equally poor, and the working correspondingly expensive.

Though the Manchurian ore, by new processes, is now made serviceable, its price is too high to justify exports to Japan. The bulk of Japan's requirements of iron ore must therefore be imported from foreign countries. In 1934 these imports amounted to 2,130,000 tons, and came chiefly from Japanese-owned mines in the Straits Settlements and China.

The import of iron ore is so expensive that it is normally restricted as far as possible. A large proportion of the raw material needed in the iron and steel industry is imported in the form of scrap iron. It is usual for large works to use as much as 50 per cent of scrap iron. In the hundreds of small open-hearth furnaces up to 70 per cent scrap iron is used. The " Iron Age " still being of tender growth in Japan, home supply of scrap is low. An average of 500,000 tons is secured annually. Accordingly, scrap iron imports have vastly increased. In 1931, Japan imported 300,000 tons ; in 1932, 600,000 tons ; in 1933, 1,000,000 tons ; and in 1934, 1,412,000 tons.

Obsolete Shipping

Obsolete shipping eagerly bought up by Japan all over the world, has served as a cheap substitute for iron ore imports. But the enormous scrap imports are a constant nightmare for Japan. She knows that this supply cannot be relied upon in all circumstances ; already there have been warnings, both in Britain and U.S.A., against the wholesale supply of what is regarded as the chief basis of Japanese armaments.

The same consideration applies, to a certain extent, to the supply of coal, which, as far as the needs of steelworks are concerned, is almost wholly imported from abroad. As a partial safeguard, Japan is piling up stocks and trying to develop sources of supply at a relative near distance.

An example is the Japanese effort, recently revealed in the House of Commons, to secure the rich iron ore deposits on a small island off the north-western coast of Australia.

At the same time, Japan is trying to extend the raw material basis of her heavy industry within her own spheres of influence, both present and potential. Manchuria, in spite of large schemes for her development, does not offer sufficient relief. It is now hoped to obtain and develop iron ore deposits in those parts of China which are within reach of Japan. Expectations, however, are moderate, as Chinese ore resources are known to have been vastly overrated.

Altogether, it is obvious that the Japanese heavy industry, for all its meteoric progress, rests on foundations which are bound to be the more unreliable the greater the national need for its products.

If a country which lacks both iron ore and cokeable coal builds up a powerful iron and steel industry, it may be assumed to do so chiefly for purposes of national security.

From the beginning the Japanese heavy industry has been protected and subsidized by the State, a process which was, and still is, very expensive for both Government and consumers. According to a statement made by the Minister of Economic Affairs, the State spends about ten million yen annually on the direct support of the iron and steel industry. There are high import duties amounting to about 7s. per ton for pig-iron, 25s. per ton for rails, 29s. for bars and rods, 75s. for galvanized plates and sheets, 144s. for wire ropes, etc.

Exempt from Taxation

Another part of the protective system is a complete exemption from taxation, for fifteen years, of all works having an annual productive capacity of 35,000 tons. This concession costs the State at present about five million yen. In certain cases the State pays a cash bounty of up to 7s. per ton of pig-iron produced ; again, some works are permitted to import foreign machinery, spare parts and other equipment free of duty. In addition to such assistance, the heavy industry, of course, receives the lion's share of the Government's orders for military and naval armaments.

Although the State has done a great deal for the heavy industry, it has not succeeded in obtaining effective control over it; it has not even been able to prevent frequent misuse of the help given. The fierce controversy over the "iron policy" of the Government, both within and without the Diet, provides an instructive example of the weakness which Japanese Governments consistently display when opposed by powerful economic interests.

In 1933 the Cabinet of Mr. Saito, revised its attitude towards the iron and steel industry. An effort was made to promote the amalgamation of the entire heavy industry of the country in one huge combine in which the State, as the owner of the largest single iron and steel works of Japan (the Yawata works), would have a controlling influence. But the Government did not dare to enforce its scheme by law, because the powerful family concerns of the Mitsui, Mitsubishi, Sumitomo, etc., are all deeply interested in the heavy industries, and resist any encroachment on their influence.

Thus only some fifty per cent of the remaining firms—and these the weakest—entered into the combine built around the Government's Yawata works.

Neither the Saito Cabinet, nor its successor, could risk a conflict with the firms remaining outside the scheme; for rearmament is the password of the day, and it demands a rapid expansion of the heavy industry. Accordingly, the Government was forced to continue assistance for the extension of works which it had the right to refuse.

State-Owned Company

The State-owned Japanese Iron Manufactory Company controls from 50 to 60 per cent of the country's steel production. In addition, it produces upwards of 95 per cent of the Japan-made pig-iron; but as the imported pig-iron goes almost wholly through other hands, the State combine cannot dominate the pig-iron market. The hope that the concentration of Japan's heavy industry, begun under Government auspices, would lead to a general lowering of iron and steel prices, has not been realized.

Japan has had to pay for the great expansion of her industrial capacity by a sharp rise in the prices of iron and steel. While the prices of nearly all other home-produced commodities have remained comparatively stable, the price of pig-iron has doubled during the last two years, and the price of steel has risen even more.

The profits of the iron and steel industry, and particularly of those firms which remained outside the State combine, increased in proportion to the rise in prices. According to the Ministry of Trade and Industry, the average profit per ton of pig-iron is Y. 10 (11s. 8d.): on steel it is Y. 20 (23s. 4d.) per ton. Some of the firms engaged in the industry are stated to earn up to 75 per cent on their paid-up share capital each year. While the highest dividends are between 30 and 50 per cent, even the least successful firms pay from seven to eight per cent. All that, of course, with complete freedom from taxation.

Meanwhile, Japan's iron and steel industry is steadily expanding. Allied branches of production, such as engineering and the chemical industries, are rapidly increasing their outputs, and the whole complex of heavy industries has by now taken root in the soil of Japan's economic life.

In spite of structural weaknesses which may at one time or another exact their toll in periodic crises, the heavy industry is to-day so important a factor in Japan's international policy that the country will spare no sacrifice to protect its further development.

Japan's Raw-Materials

C. Rivers Anderson in the *Asiatic Reviews* points out that Japan has always been dependent on foreign supplies for raw materials, and during the last few years the demand greatly increased. This has been chiefly due to the great expansion in the light and heavy industries occasioned by her huge export trade and by the demand for materials on the part of the Army and Navy. Imports of industrial raw material in 1934 amounted to Y.1,400,000,000 or approximately 61 per cent of Japan's total import trade.

With the exception of silver, the domestic production of all metals is insufficient to take care of the demand. Although ferro-alloys and steel are at present produced in almost self-sufficient quantities, their constituents are to a large extent imported. The country can only rely upon its supply of iron equal to 13 per cent of steel requirements. In pig-iron Japan is 50 per cent self-sufficient, in copper 80 per cent, in iron ore 35 per cent, and in lead, zinc, and tin between 10 and 50 per cent. In nickel, antimony, quicksilver, platinum, and aluminium dependence is almost entirely on foreign supplies.

On the other hand, Japan is fortunate in having abundant supplies of sulphur, which are a great source of strength to her chemical industry. In refined sulphur there are surplus supplies, and the country is self-sufficient in sulphur ore and pyrite. Further, the ceramic industry is greatly strengthened through abundant supplies of clay, kaolin, silica sand, limestone, and gypsum. In salt, a basic material for her alkali industry, Japan does not fare so well, having only 50 per cent of her requirements. About 20 per cent of her salt, however, comes from the Kwantung Leased Territory, where the industry is rapidly expanding. Soda ash production has recently increased considerably; 20 per cent of the demand is imported. Caustic soda production is ample for present needs.

Until quite recently Japan was entirely dependent upon foreign sources of supply for nitrates, but during the last few years great progress has taken place in the nitrogen fixation industry, which is now capable of supplying almost the entire demand for nitrogen. Less than 10 per cent of the country's needs in mica, asbestos, phosphates, magnesite, and potash are met by domestic supplies. In mica, asbestos, and phosphates supplies are very limited with regard to both quality and quantity. New supplies of magnesite and potash have been discovered, and these will tend to reduce imports.

Organic Supplies

Japan is well provided with raw silk and fish oil, but is very deficient in supplies of wool, bristles, hides and animal fats. The export of raw silk in 1933 amounted to about 70 per cent of the total production, while the domestic supply of wool, in spite of an increased demand, amounted to only 300,000 pounds. As Japan has never gone in for stock raising on a large scale, the domestic supply of hides is naturally small, and imports are necessary in order to supply the demand for leather. In cow leather only is Japan nearly self-sufficient. The demand for bristles for the large brush manufacturing industry, and for shells for the button industry, is large, and imports of these raw materials are absolutely necessary.

Japan, with abundant supplies of vegetable materials, is in a position to export camphor, peppermint and isinglass. While lumber supplies are plentiful, there are large imports annually for special types of constructional timbers. Vegetable oil supplies are large, and are available for export, but the production of oil seeds, with the exception of soya beans, is only 40 per cent of the domestic demand.

Raw cotton is Japan's most greatly needed vegetable material for the important textile industry. Her annual requirements amount to some 1,000,000 metric tons, while her domestic production scarcely reaches 100,000 tons (in seed cotton). Thus the country is entirely dependent upon foreign sources of supply for raw cotton. In 1933 imports of raw cotton were valued at Y.600,000,000 corresponding to about 30 per cent of her total imports. In pulp for paper-making purposes imports are relied upon to the extent of 20 per cent of the demand; but in the case of rayon pulp, the demand for which amounts to 60,000 tons annually, reliance is entirely on imports, although steps are being taken to remedy this situation. The productions of hemp and jute amount to only 40 per cent of the demand. Shellac, rosin, and tanning materials are almost all imported.

Increase in Petroleum Products

The coal output of Japan in 1933 amounted to approximately 36,000,000 metric tons, imports to 4,000,000 tons, and exports to 1,750,000 tons. The country would thus appear to be about 94 per cent self-sufficient in coal. In anthracite, however, only 60 per cent of the demand is met from domestic sources, not including the Navy's requirements. Coal required by the carbonization industry amounts to about 4,000,000 metric tons annually, and part of this must be met by imports. In by-products of the coal industry Japan is self-sufficient.

Only seven per cent of the demand for petroleum products is met from domestic sources of supply. In 1933 the output of crude

(Continued on page 258)

The Japanese Machinery Exposition in Shanghai

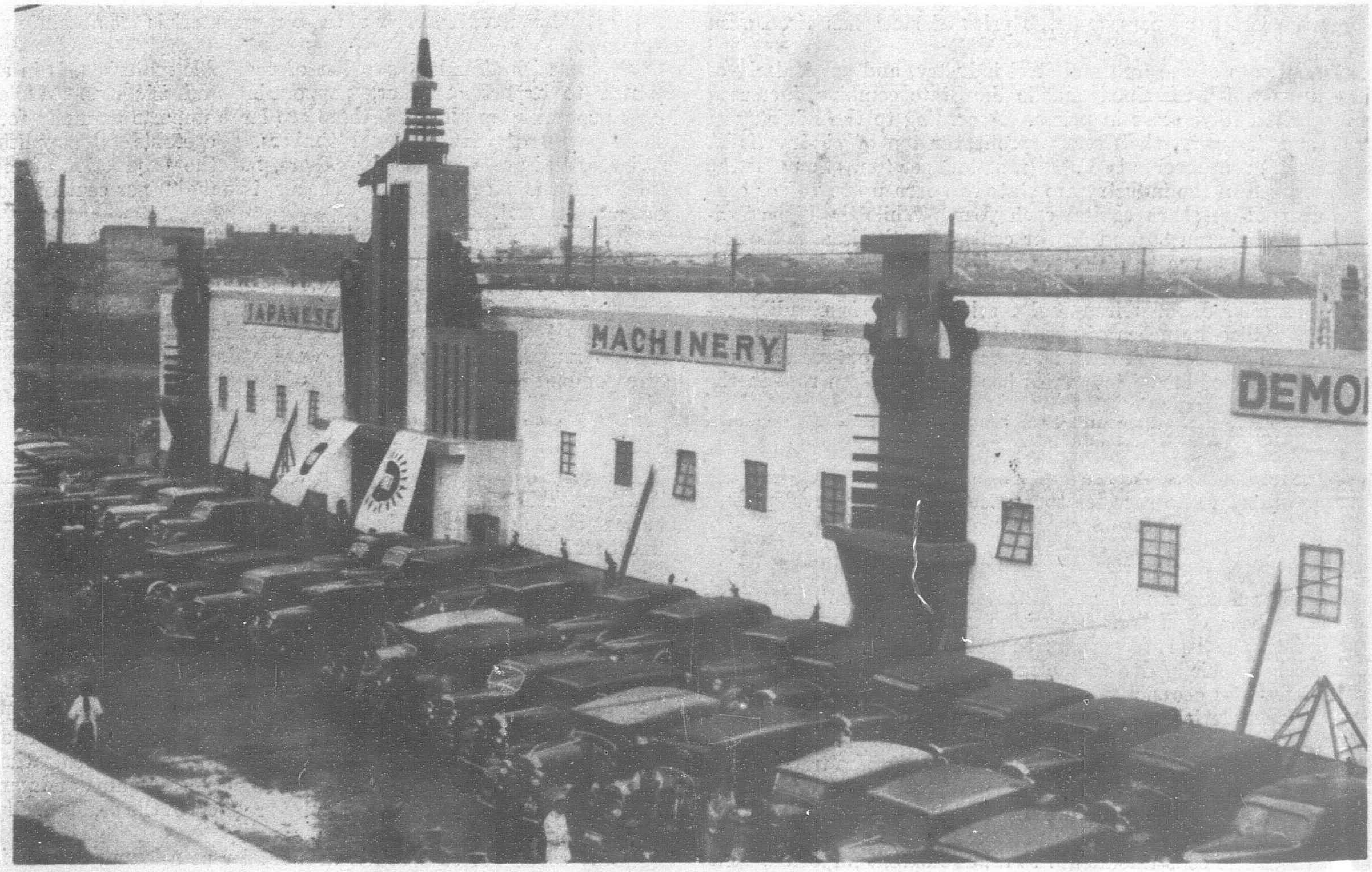
A LARGE-SCALE undertaking that in view of the state of business conditions is more than ordinarily ambitious is the Japanese Machinery Demonstration that was opened in June in Shanghai. Not unlike an American state fair, it consists of an exhibition of diverse mechanical products shown in booths in a sizable temporary structure that encircles on three sides an extensive inner area of about three acres. It is located in the 800 block of North Szechuen Road on a large vacant piece of land on the north bank of the Wampanjao Creek. As a bid for popular favor the admission price was put at a nominal figure—forty cents for adults and half this sum for children—while special concessions were granted to schools and special groups attending the Exhibition.

The Main Entrance

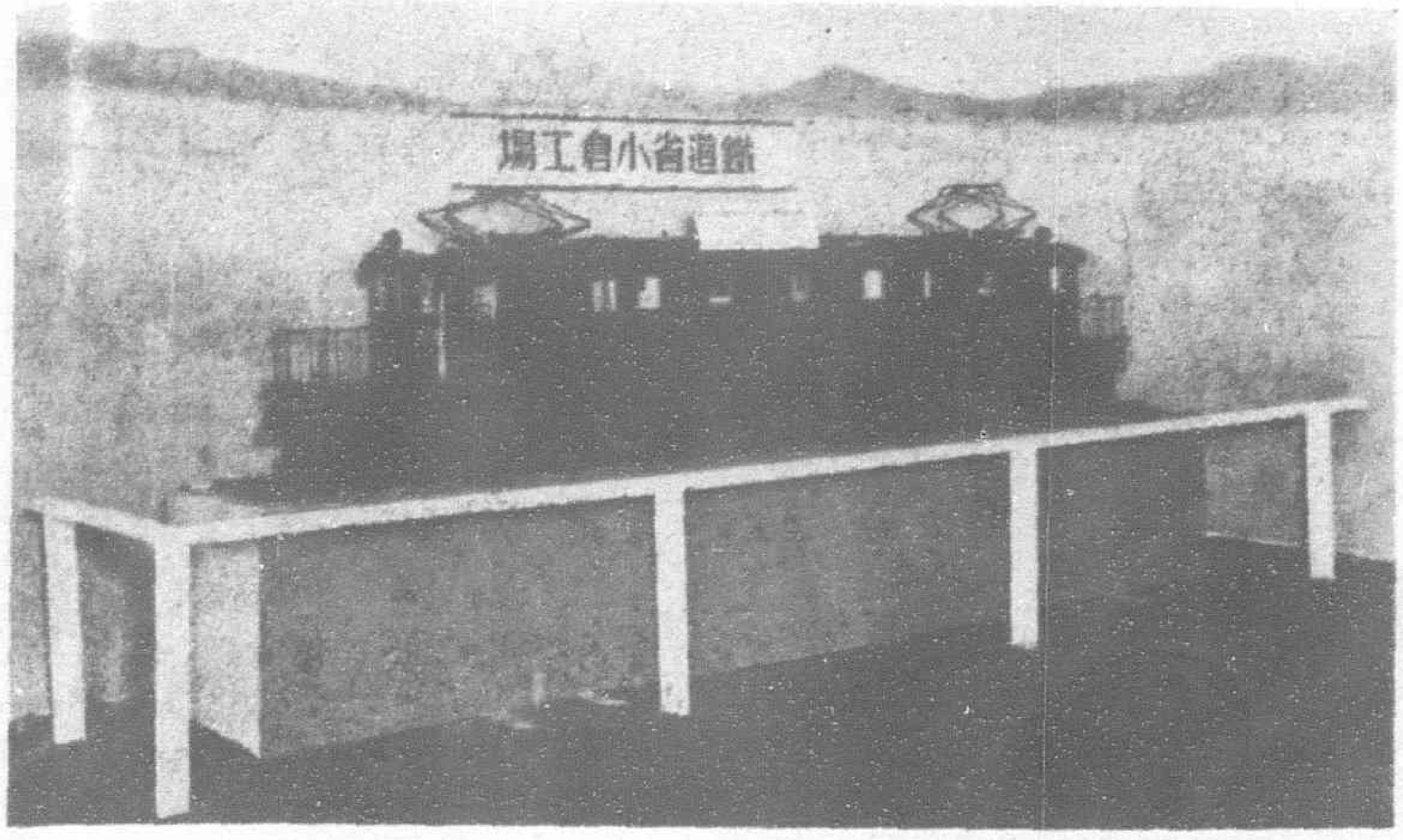
Supplementing the display of machines of various kinds, in action and silent, a line of booths outside of the building facing the inner enclosure furnishes space and scope for highly energized sellers of novelties of one kind and another as well as for refreshments of various kinds that may be obtained. In passing, it may be said that some of these novelties on sale at the Exhibition merit a little attention. The lusty-lunged gentleman who demonstrates the uses of highly tempered and, in his hands, extremely effective saw blades challenges the onlookers' interest when it is shown that the device offered containing three saw blades and a large knife fold up compactly like a jack knife into the handle of the thing. Then there is the demonstrator of the knife sharpening gadget consisting of a stone and a small device employed for the sharpening of safety razor blades. Further along is displayed an ingenious method of patching and mending cloth materials, shown by a zealous young Japanese salesperson who snips off small sections from the fabric of half hose and stockings and promptly patches the holes with neatness and dispatch, not to mention a white substance that he offers for sale. These are just a few of the many odd articles seen in the selling booths.

The Girl Pearl Divers

One of the added attractions at the Exhibition, which is undoubtedly its outstanding feature of general interest, in the pearl diving demonstration. This takes place in a sizable tank of water that is illuminated and has a depth of fifteen feet. The audience



The Szechuen Road Front of the Japanese Machinery Exposition located in the 800 Block of North Szechuen Road near the Wampanjao Creek



Model of a modern electric locomotive similar to those brought into service on the Japanese Government Railways

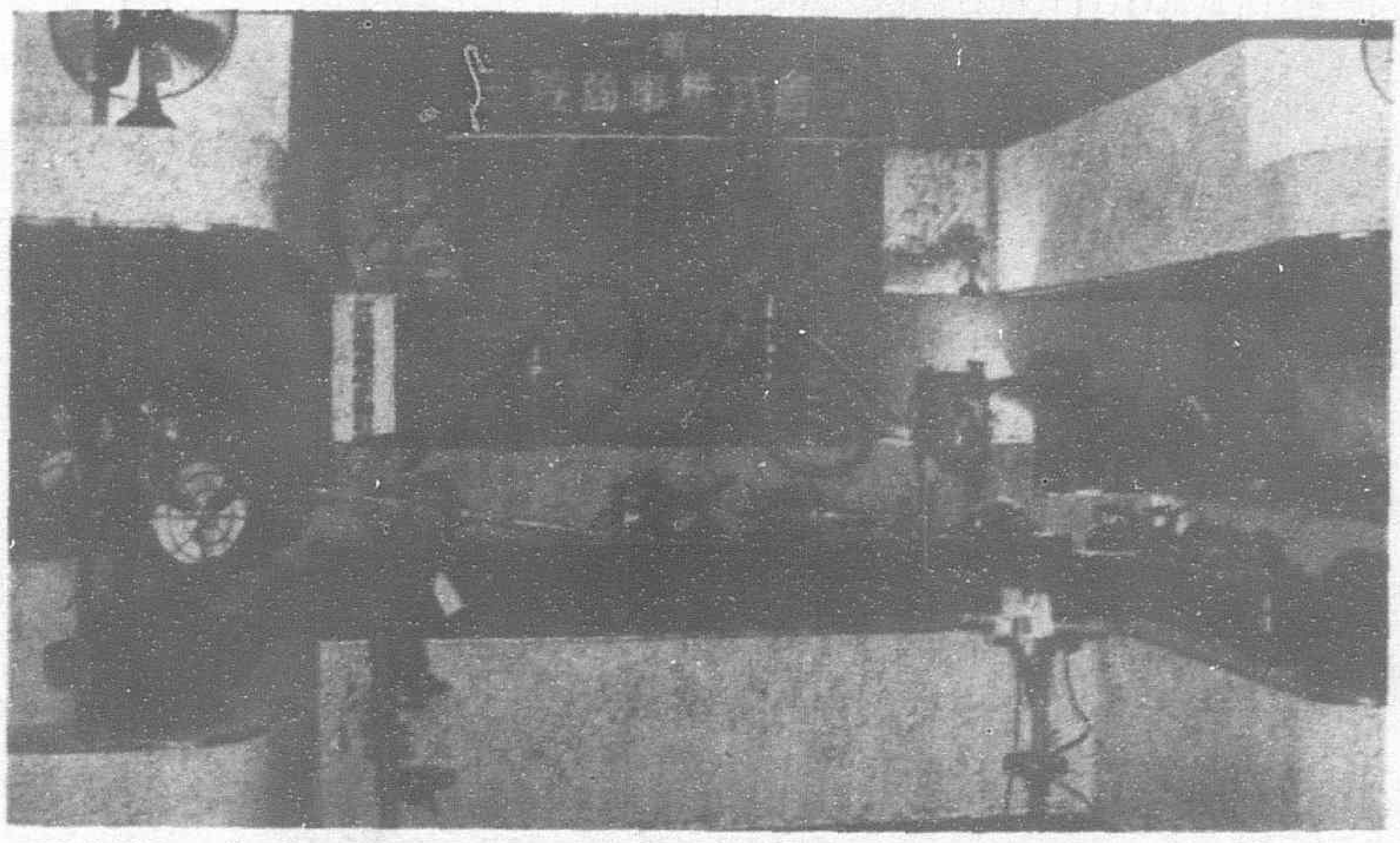


Exhibit of electric tools manufactured by the Mitsubishi Denki K.K. of Tokyo

A unit of mechanical equipment in the exhibit of the K.K. Osaka Wakayama Tekkosho—the Osaka Wakayama Iron Works

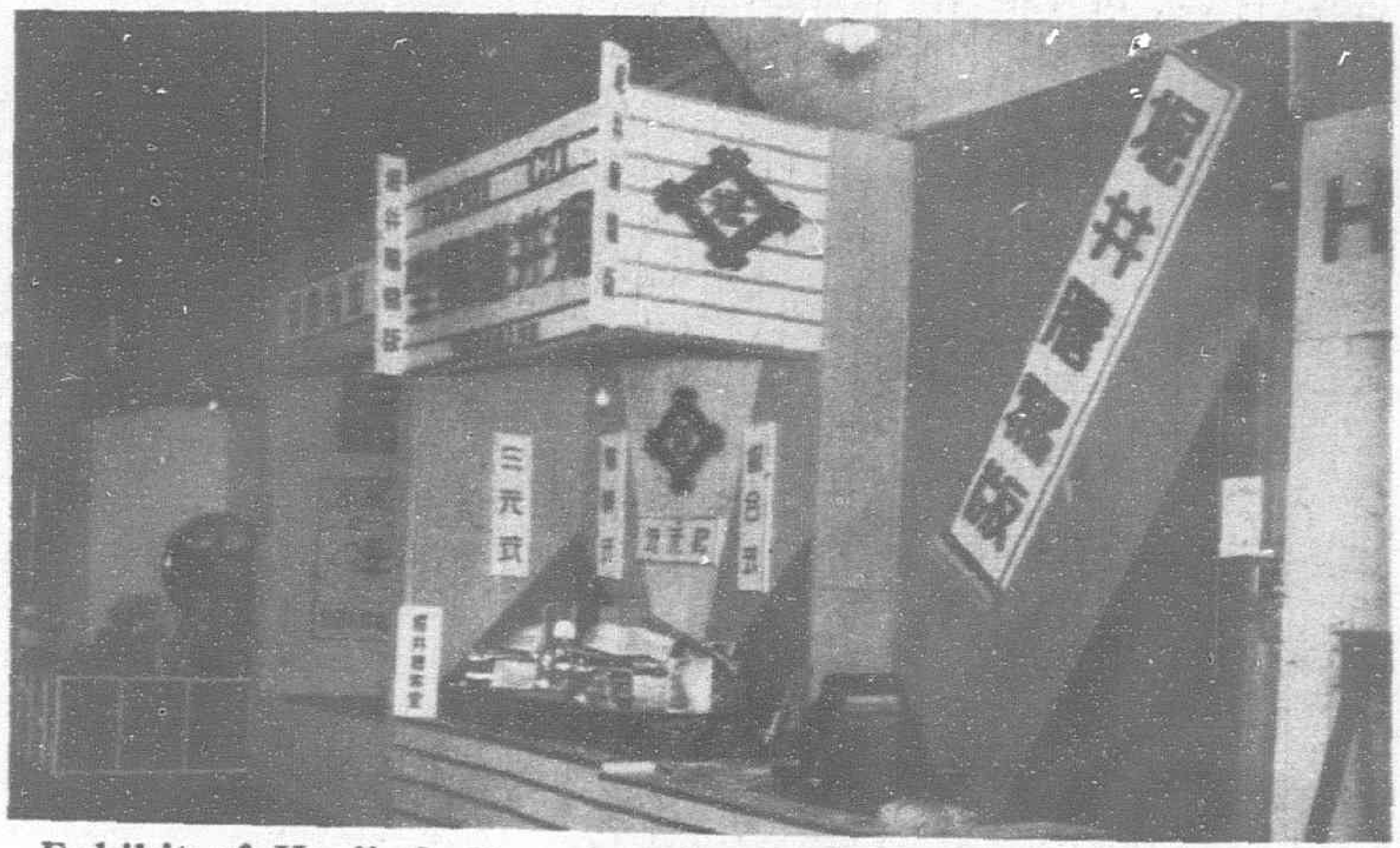
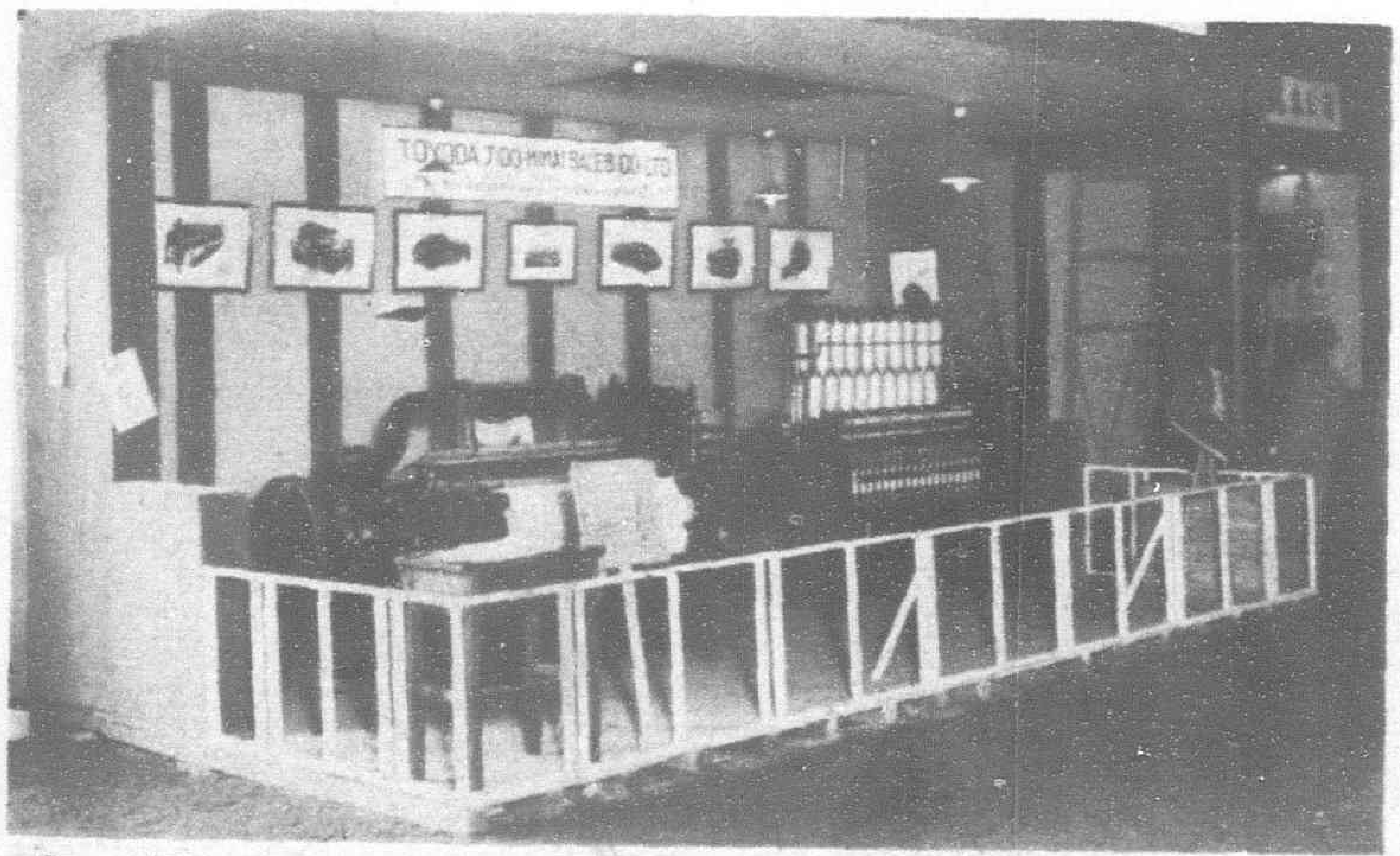
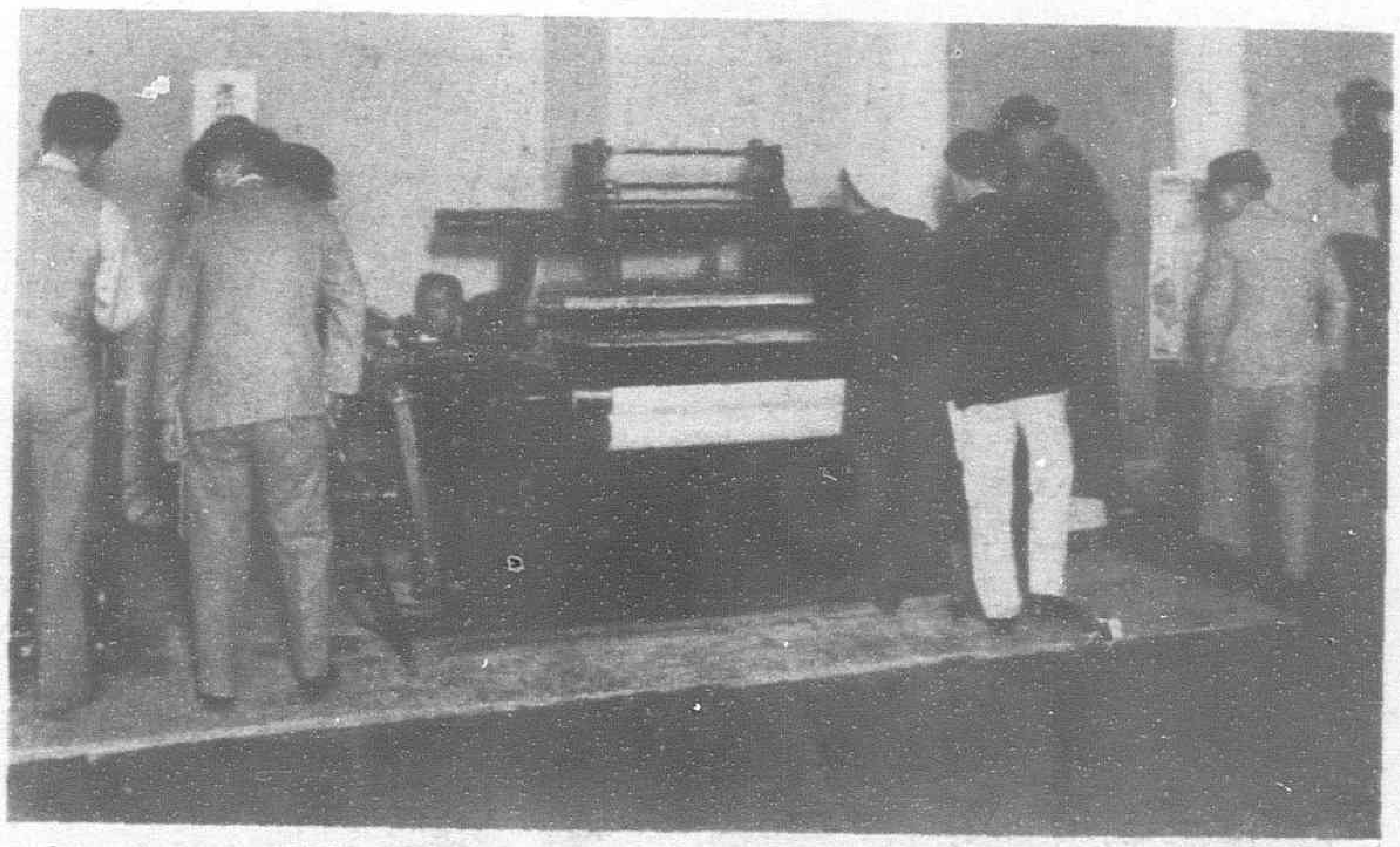


Exhibit of Horii & Do, manufacturers of the "Myriograph," showing machine both manually and electrically operated



One of the outstanding spinning machine exhibits of K.K. Toyoda Jido Shokki Seisakusho, showing loom in operation



Another exhibit of a loom in operation of Enshyu Shokki K.K. This is an automatic loom

Exhibit of automobile parts manufactured by K.K. Daido Denki Seikosho

Exhibit of water filters manufactured by the Nippon Gaishi K.K.

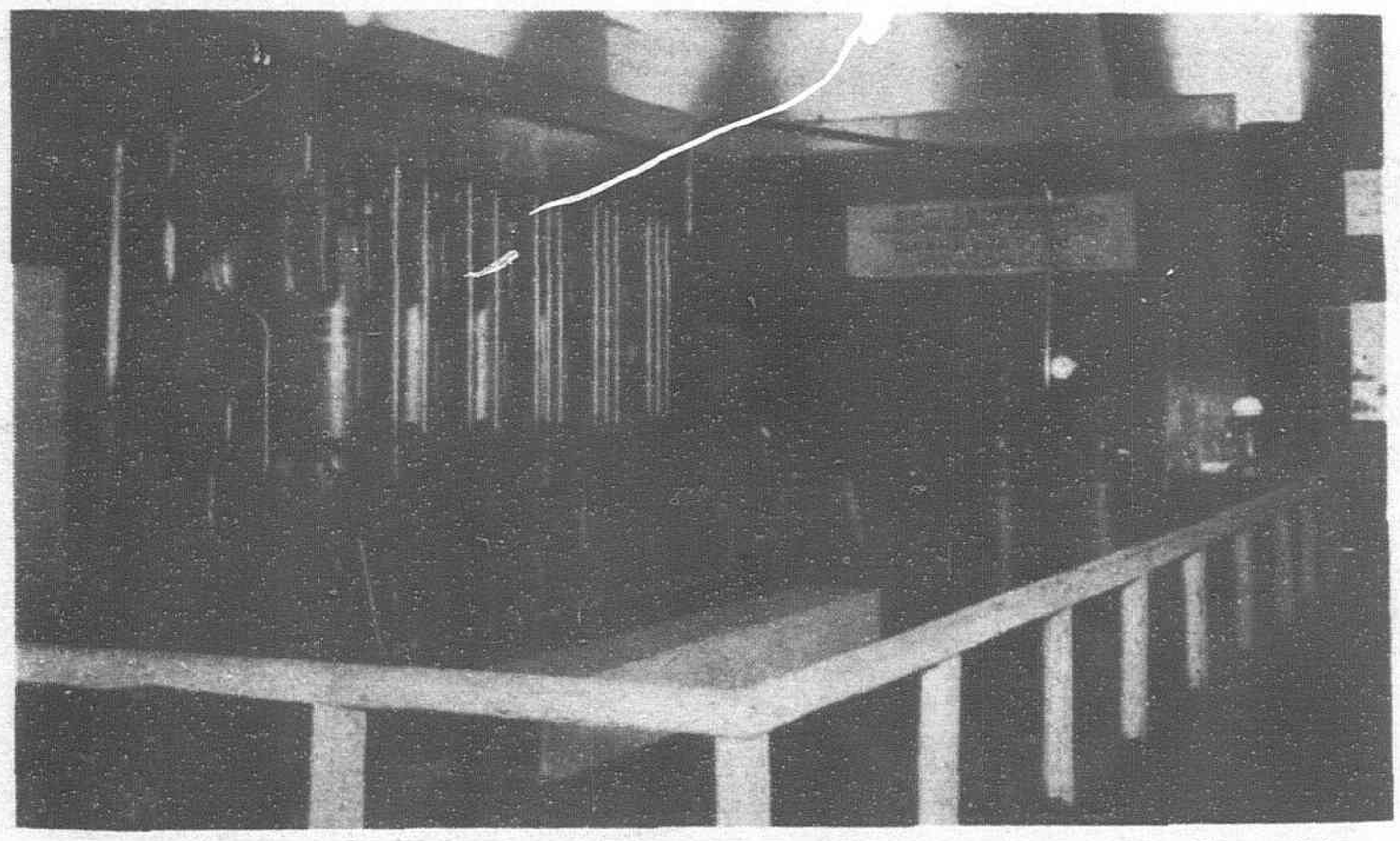


Exhibit of a marine diesel engine manufactured by K.K. Hanshin Tekkosho of Kobe showing engine in operation

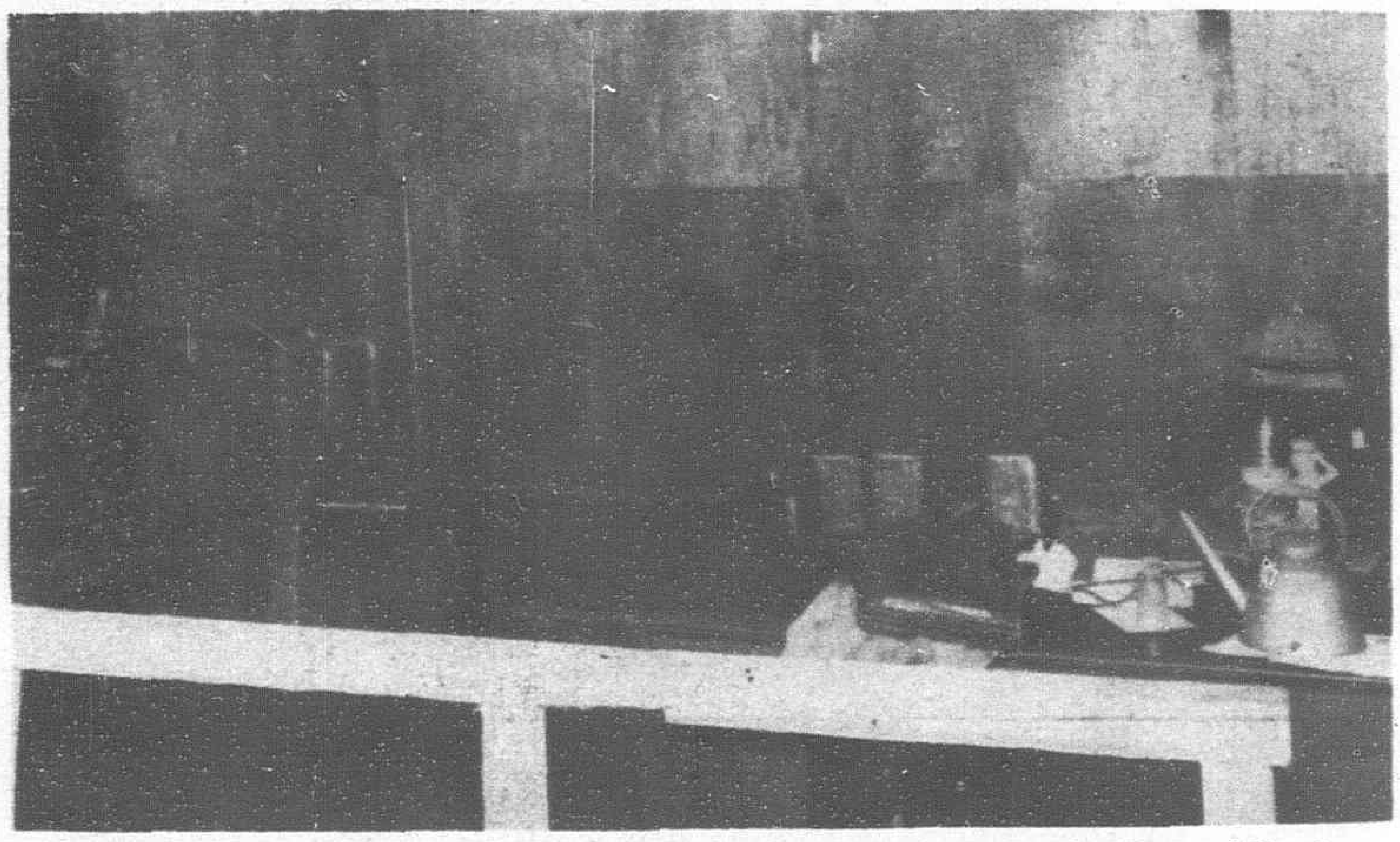
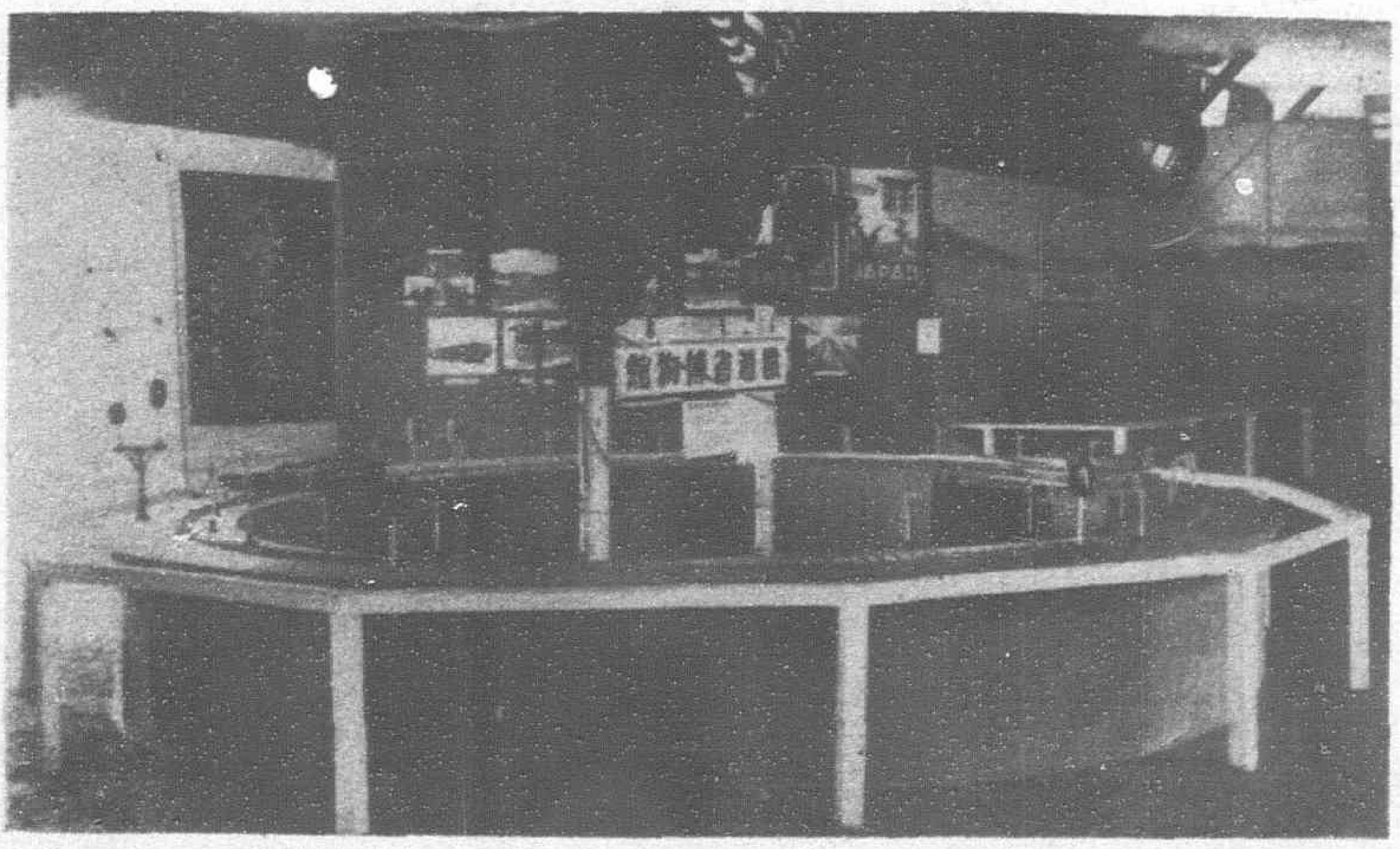
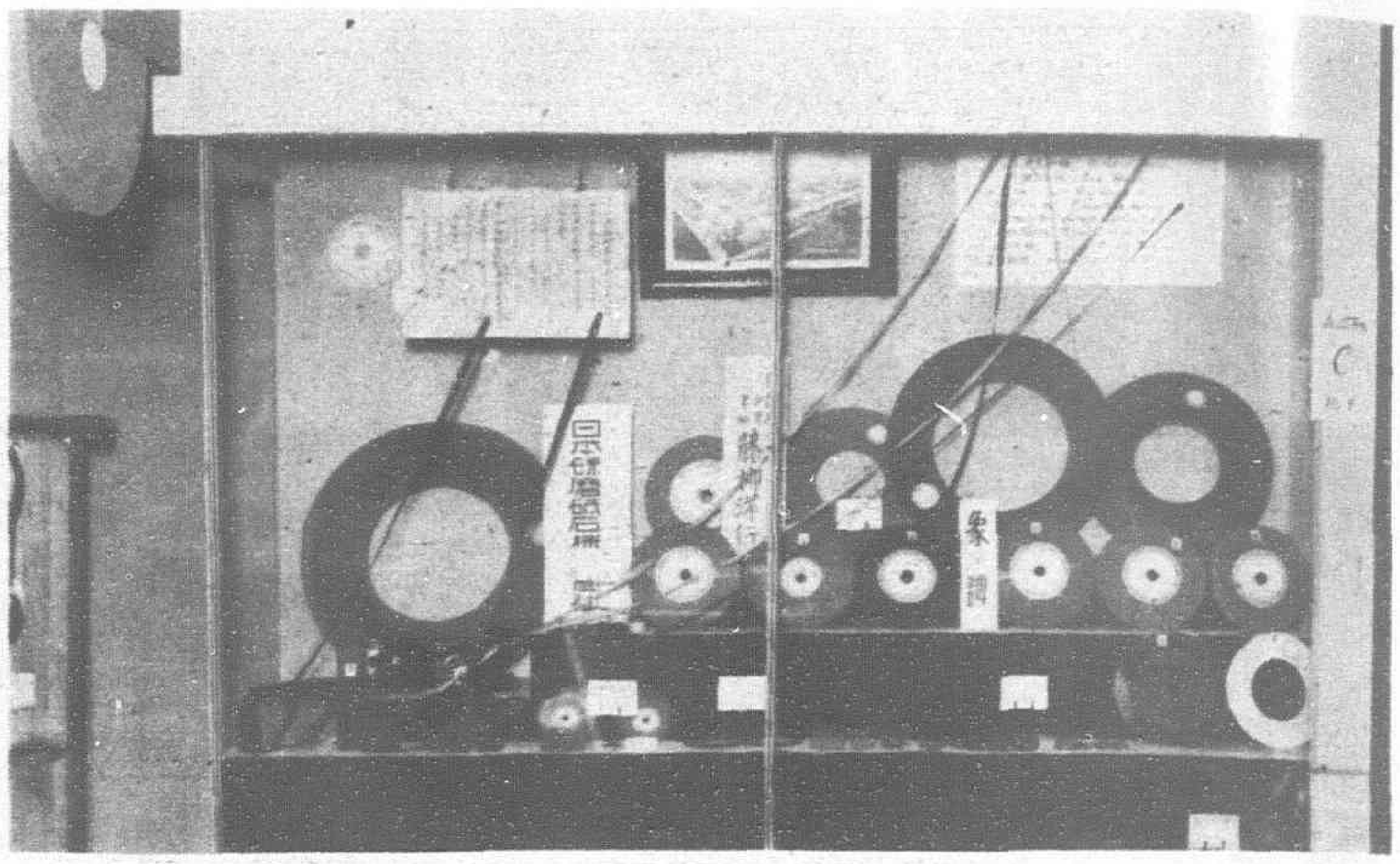


Exhibit of the K.K. Hanshin Tekkosho—the Hanshin Iron Works Ltd. of Kobe, with diesel marine engine in operation

Exhibit of electric motors and machinery supplied by K.K. Hidachi Seisakusho—Hitachi Ltd., of Tokyo



Another exhibit of the Japanese Government Railways showing miniature trains in operation illustrating visually safety signal lighting of block system, all operated electrically



Exhibits of whetstones manufactured by the Nippon Kemma Toishi K.K.

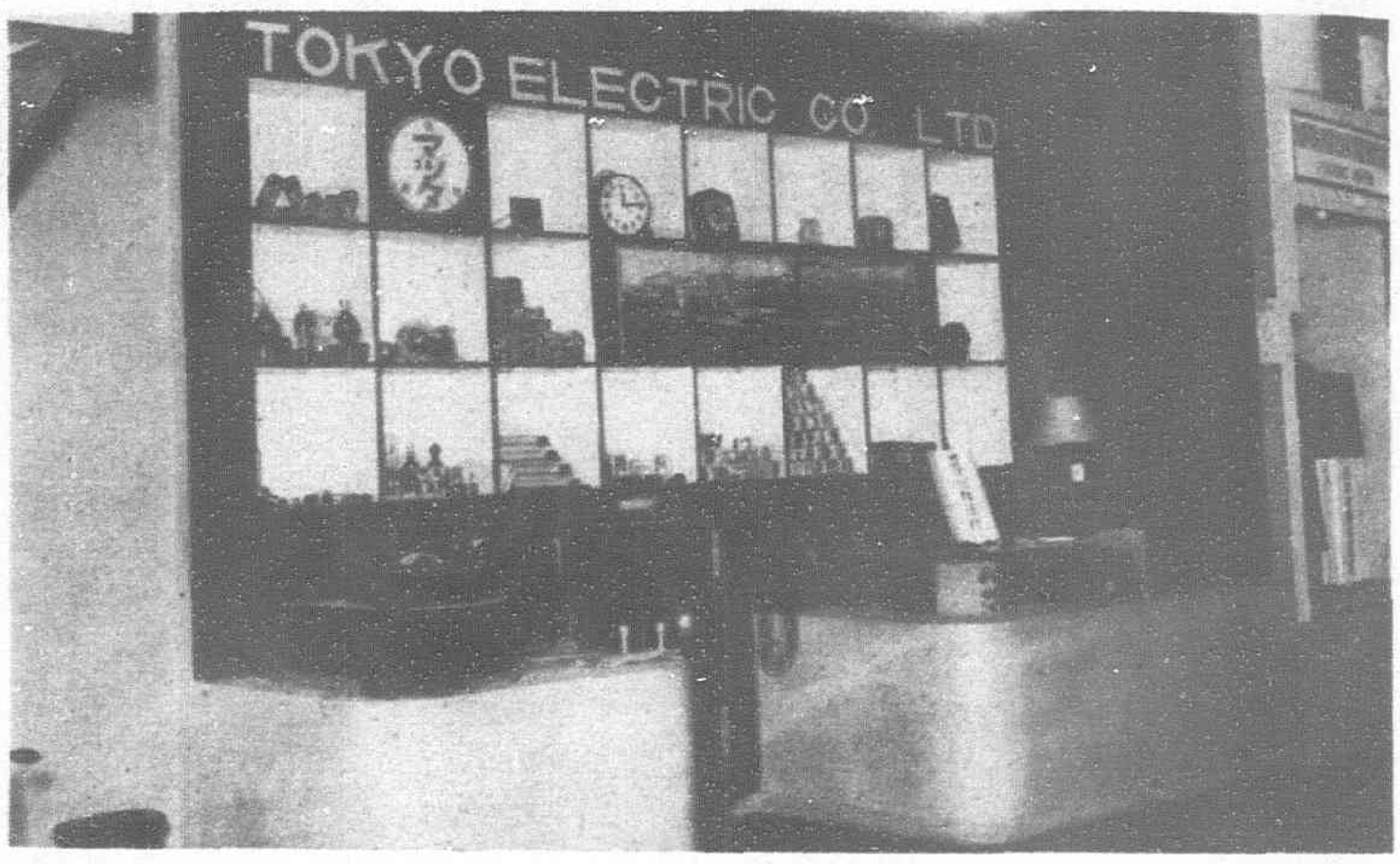


Exhibit of radio apparatus manufactured by the Nippon Denki K.K. The Tokyo Electric Company, Ltd.

Exhibit of machine tools and air compressors supplied by Gomei Kaisha Washino Shoten—Washino & Co., of Nagoya

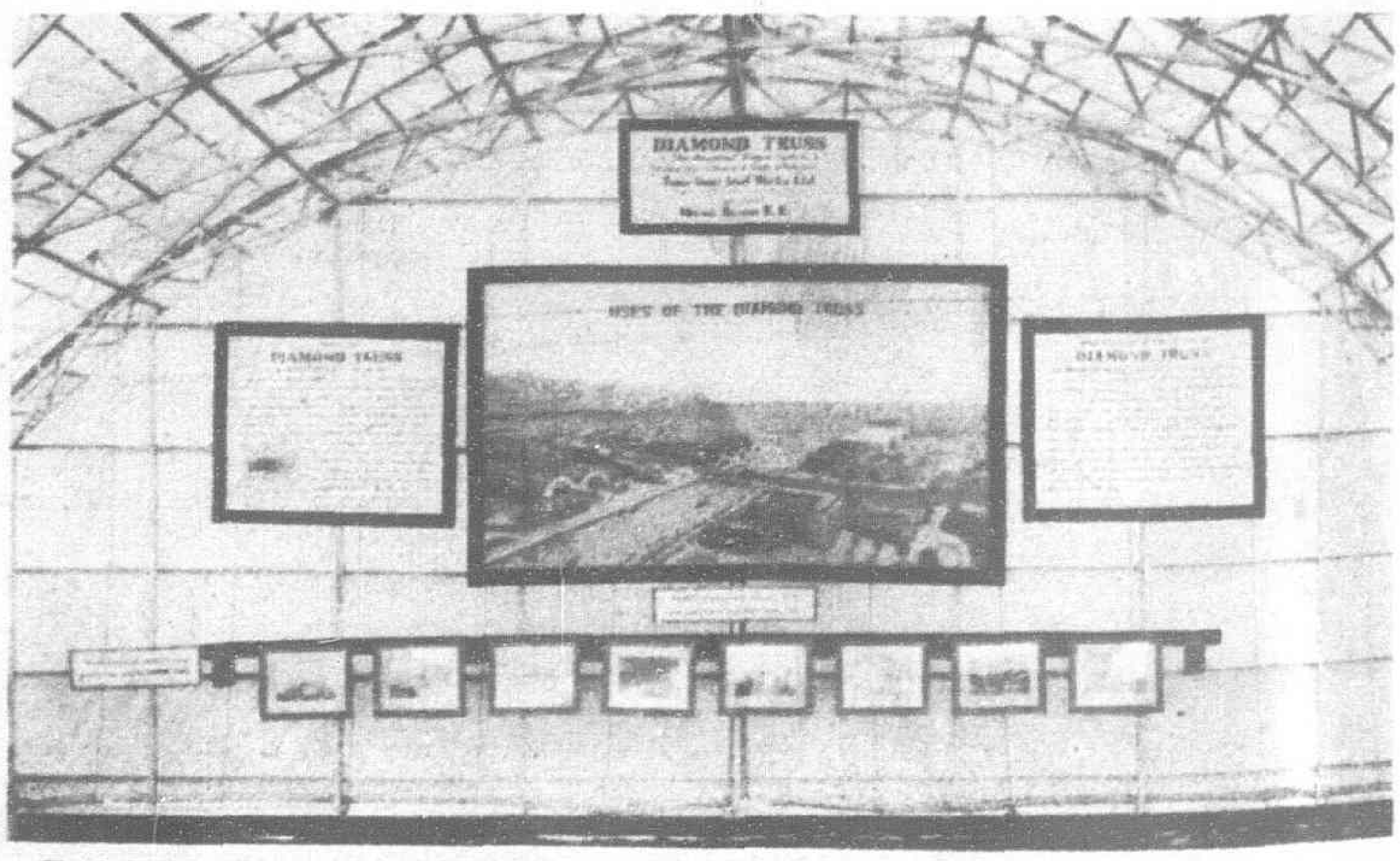
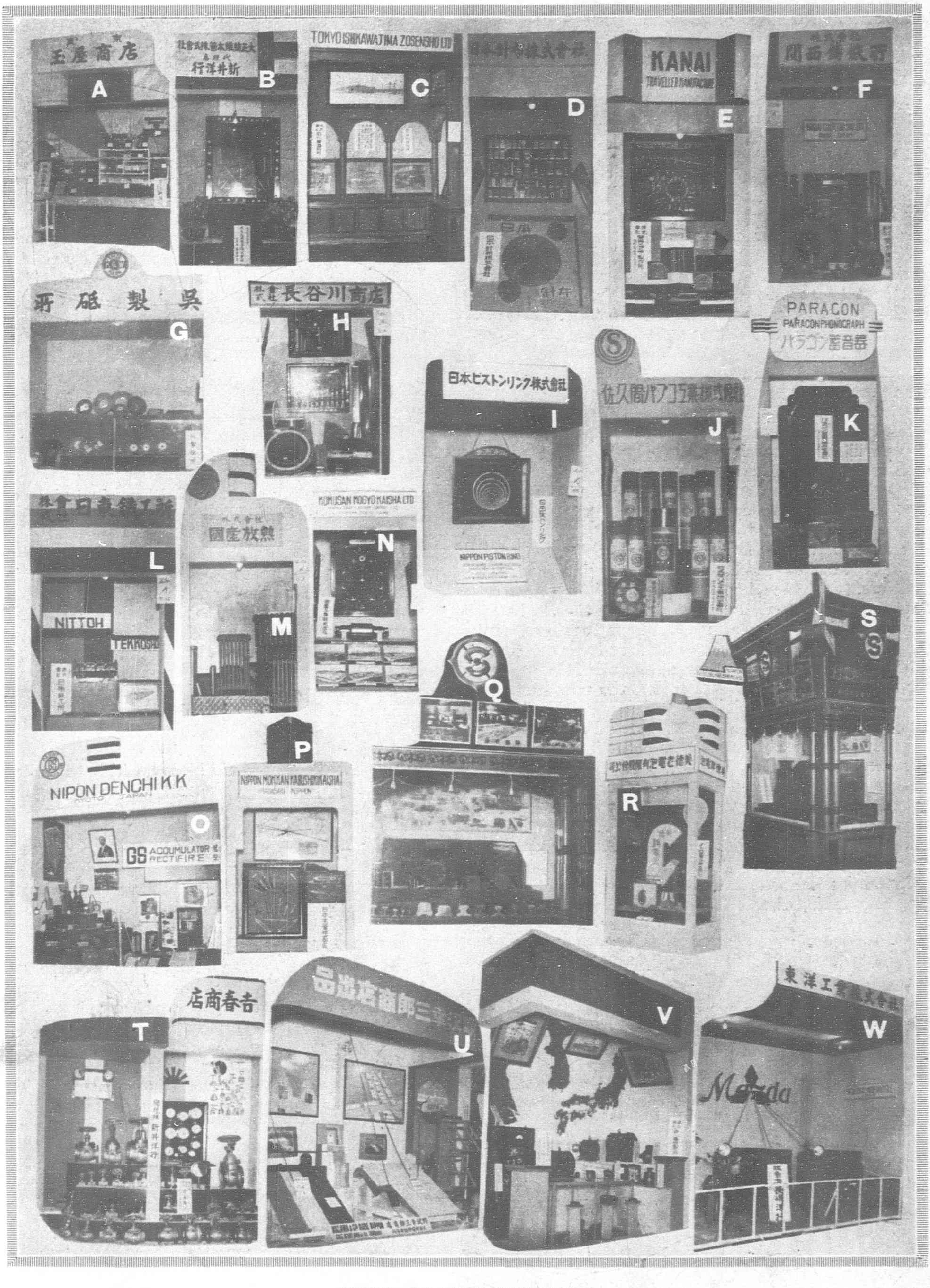


Exhibit of portable hangar constructed with a steel frame of the celebrated "Diamond Truss" manufactured by the Tomoe Gumi Steel Works, Ltd.

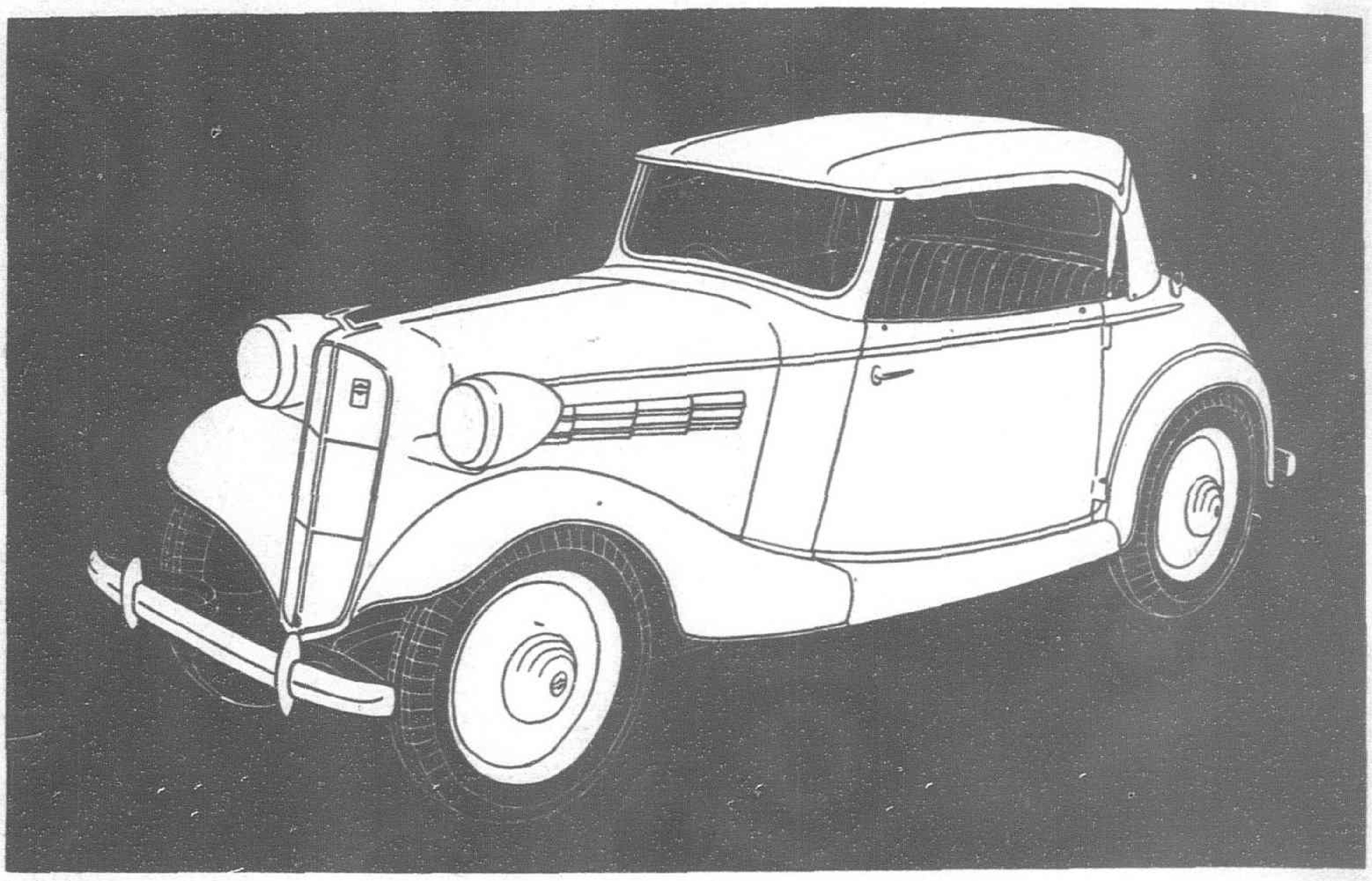


SOME OF THE EXHIBITS

A—K.K. Tamaya Shoten, surveying instruments
B—Taisho Boseki Mokkan K.K., weaving and spinning machines
C—K.K. Ishikawajima Zosensho, photographic equipment
D—Kanai Traveller Seizosho, travellers
E—Nippon Shimpu K.K., spinning machinery
F—K.K. Kansai Chyutetsusho, chain block railway machinery
G—Kure Seito Jo Kokura Shutchosho, whetstones
H—K.K. Hasegawa, spinning machinery
I—Nippon Piston Ring K.K., automobile parts
J—Sakuma Papuko Kogyo K.K., building materials
K—Paragon Phonograph K.K., phonographs
L—Nitto Tekkosho, weaving and spinning machines
M—Kokusan Honetsu K.K., radiators
N—Kokusan Kogyo K.K., roll and coupling
O—Nippon Denchi K.K., storage batteries
P—Nippon Mokkan K.K., spinning machinery
Q—Nippon Seitetsu K.K., rails
R—Metro Denkyu K.K., electric lamp valves
S—Nippon Seitetsu K.K., rails
T—Yoshiharu Shoten, valves, pressure gauges
U—Nozawa Kosaburo Shoten, building materials
V—K.K. Yasukawa Denki Seisakusho, motors
W—Toyo Kogyo K.K., Mazda auto-tricycle

is enabled to see through a sheet of glass on one side of the tank the feats of the young diving girls who remain under water for long periods. It should be added that these youthful mermaids in presenting their exhibition are more completely clad than they would be in even the oldest fashioned of old fashioned feminine bathing suits. In the water, in fact, their appearance could not offend the tenderest sensibilities, for they disport themselves like strange gaily-colored fishes in their swimming and diving. In connection with the pearl diving exhibition those who attend are afforded the opportunity for a nominal sum to acquire a real pearl taken direct from an oyster opened before the eyes of the purchaser, one oyster after another being opened until one containing a pearl is found and the gem then becomes the property of the purchaser.

Another of the structures fronting the large inside enclosure with its central fountain and canvas advertising obelisks at the Exhibition contains ranks of seats so that the place may be used for meetings or speech-making. Tea rooms, ice cream booths and a section under gay colored canvas where Japanese beer and food are served to the accompaniment of musical loud speakers are details for the diversion of visitors.



The Datsun Sportster Coupe on display at the Exhibition. One of the cars to be given away to a lucky ticket holder. This is the exhibit of the Nissan Jidosha Kaisha Ltd., of Yokohama

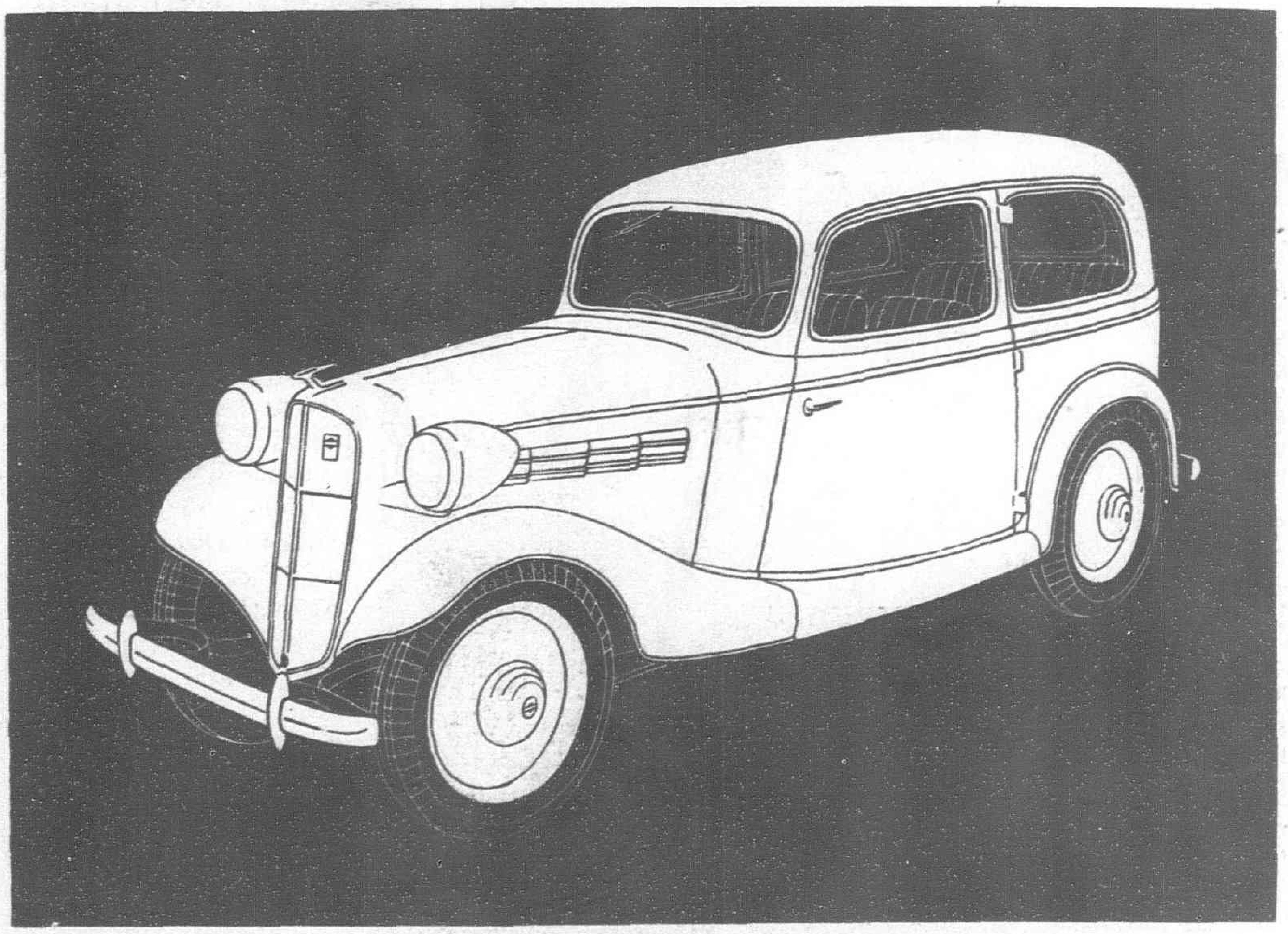
One attractive inducement that is offered for those who visit the Exhibition is the chance that all visitors have to win a swanky modern motor-car. Two of these automobiles are to be given away at the Exhibition. They are 1936 Models, one a Roadster Coupe, and the other a Sedan, of the Datsun make, the new car manufactured by the Nissan Jidosha Kabushiki Kaisha with which the Japanese makers are challenging the motoring world with the potent argument that they are offering a modern automobile constructed of the highest grade materials under the mass production system with machining and shaping second to none in the world for a small car that runs forty-five miles on a gallon of gasoline—and most important, at a very low price. The manufacture of the Datsun car in the Yokohama plant of the Nissan Jidosha Kabushiki Kaisha and the story of the development of the automobile manufacturing industry in Nippon is described in detail in an article published in the preceding, May issue, of *The Far Eastern Review*. The two automobiles that are to be given away, shown in accompanying illustrations, are on display at the Exhibition.

Each entrance ticket to the Exhibition is in two parts both bearing the same number, and as visitors enter, the numbered stubs of their tickets are taken and placed in sealed boxes. The drawings are to take place publicly at fixed times in the presence of police officials and representatives of the press when the winning numbers will be announced. The number of chances to be issued on each car is limited to 50,000, and as unfavorable weather through the month of June has kept down attendance, it is probable that the total numbers of stubs will be well within these limits. It is to be added that in Shanghai the retail price of the Datsun, similar to those on display, is given as Shanghai $2,300.

Miniature Railway in Operation

Outstanding among the exhibits and the first to greet the eyes of the visitor is that of the Japanese Government Railways. One section of this exhibit consists of a model of the new electric locomotives that have lately been brought into service in Japan. In the other part of the Government Railways exhibit, in the center of the entrance, is a complete section of railway in miniature, operating electrically on a circular track with stations, switching devices, signal towers and lights, and supplementary side tracks showing a complete train of electric locomotive and passenger cars running under block system control. All details of the system of operation in use on the lines of the Japanese Government Railways in Nippon are shown clearly in miniature in the Exhibit.

Near the exhibit of the Japanese Government Railways the Dairen Kisen Kaisha have a booth in which is shown a model of one of their large passenger vessels. From the left of the entrance a broad corridor extends through the structure on each side of which, in booths and enclosures are the exhibits, many of them in operation. Among the displays of moving machinery the exhibits of weaving and spinning equipment, showing the manufacture of woollen, cotton and rayon cloth are especially complete and interesting. These looms and cloth-making machines are attended by deft operators working before the throngs as they would in the mills, and the



The Datsun Sedan on display at the Exhibition to be given away to a lucky ticket holder. This is the exhibit of the Nissan Jidosha Kaisha Ltd., of Yokohama

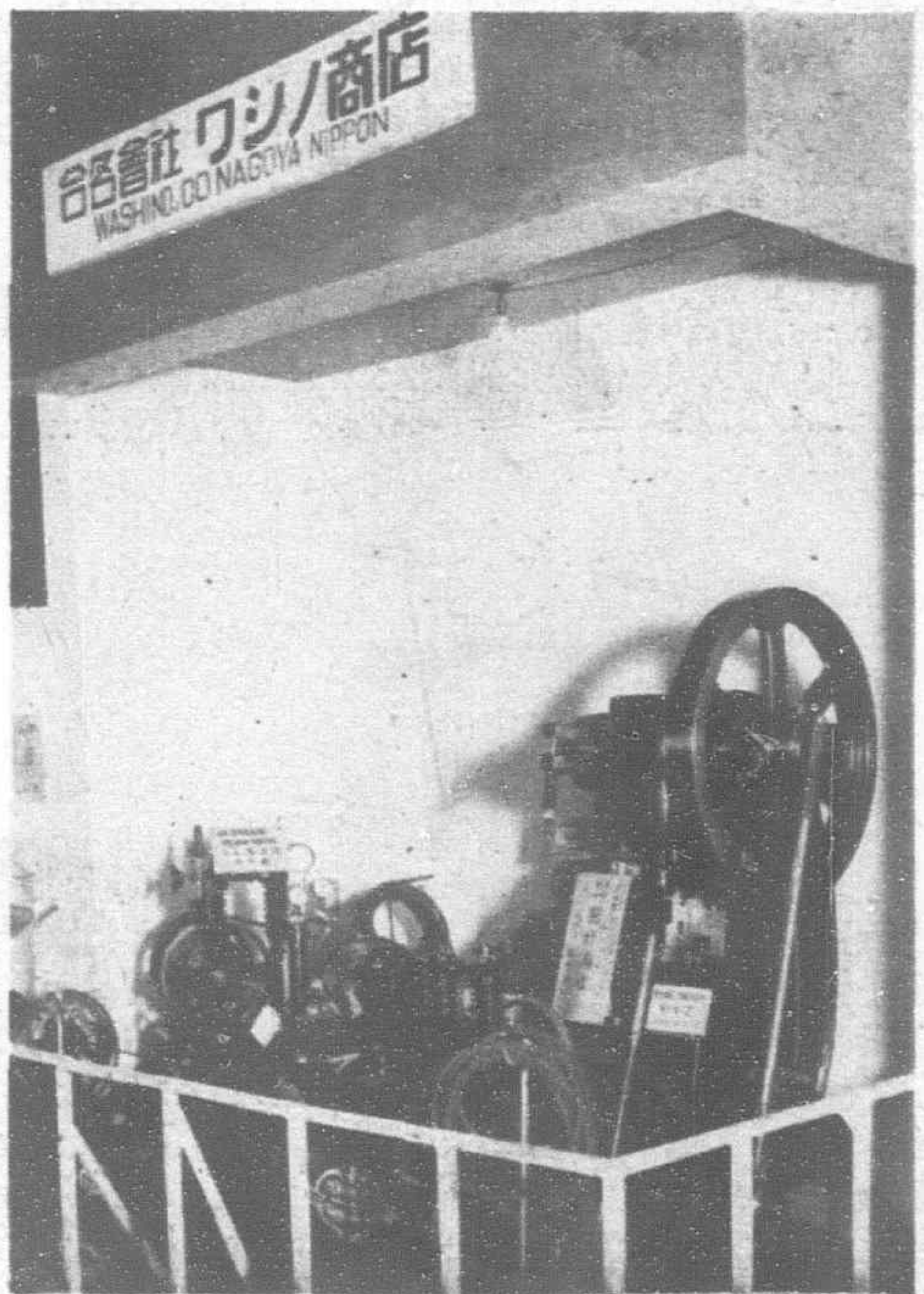
野上式自動織機株式會社
NOGAMY AUTOMATIC LOOM WORKS LTD.
MITSUBISHI SHOJI KAISHA, LTD.

Automatic loom in operation at the Exhibition, an exhibit of the Nogami Shiki Jido Shokki K.K. of Nagoya

Twisted thread machine exhibited by the Sashiyoshi Gomei Tokkyo Yoriito Kikai Seisakujo of Gifu City

product of the machines made there before the eyes of the spectators is on sale at a nominal charge, providing bargains in rayon and other cloth of which many are glad to take advantage. Among the companies having displays of this character at the Exhibition are: the Nippon Shimpu K.K. of Tokyo, showing parts of spinning machinery; Nitto Tekkosho of Osaka, showing parts of weaving and spinning machines; K.K. Hasegawa of Osaka, showing parts of spinning machinery; Enshyu Shokki K.K. of Hamamatsu City, showing automatic loom; Taisho Boseki Mokkan K.K. of Tokushima-ken, showing parts of weaving and spinning machinery; Suzuki Shiki Jido Shokki K.K. of Hamamatsu City, showing woollen, cotton and rayon weaving machinery; Nippon Mokkan K.K. of Amagasaki City, showing parts of spinning machinery; Sashiyoshi Gomei Tokkyo Yoriito Kikai Seisakujo of Gifu City, showing twisted thread machine; K.K. Toyoda Jido Shokki Seisakusho of Aichi-ken, showing loom and spinning machinery, and Nogami Shiki Jido Shokki K.K. of Nagoya, showing an automatic loom.

Boring machine for mining exhibited by the Hasegawa Seisakusho of Yokohama

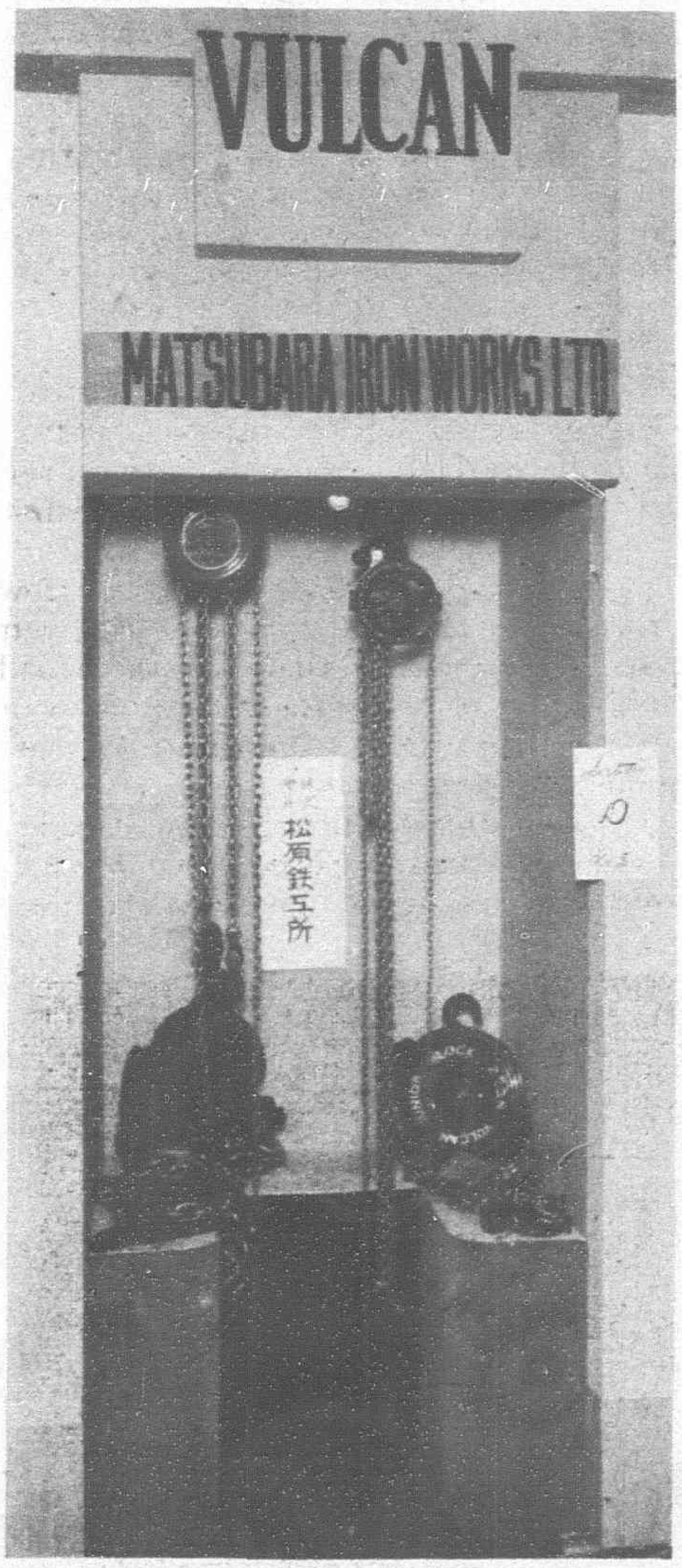


Machine tools and air compressor exhibited by the Gomei Kaisha Washino Shoten of Nagoya

Buses, Automobiles, Motorized Tricycles

An outstanding exhibit that arrests attention is a full-size passenger omnibus for twenty seated passengers resplendent in its glossy cream varnish, gleaming chromium and leather upholstery. This is powered with a modern Diesel engine and is a product of the Mitsubishi Jukogyo K.K. of Tokyo. Also in the line of transport adjoining the Datsun automobile exhibit are shown Mazda Auto Tricycles manufactured by the Toyo Kogyo K.K. of Kobe. Another impressive exhibit is a full-size marine Diesel engine chugging faithfully at slow measured speed. This is an exhibit of the K.K. Hanshin Tekkosho of Kobe. One of the special exhibits, a whole structure in itself, erected outside of the main building in the central enclosure is a portable airplane hanger, a huge metal hollow arch canvas covered and made of the celebrated "Diamond Truss" structural steel. This is an exhibit of the K.K. Tomoegumi Tekkosho of the Machinery Department of Mitsui Bussan Kaisha of Tokyo. Also near it in the enclosure is a pile of cast iron piping of various sizes displayed by the K.K. Kubota Tekkosho.

Other exhibits include products of the Nippon Typewriter K.K. of Tokyo, showing typewriters and a type caster in operation; steel rails exhibited by Nippon Seitetsu K.K. of Tokyo; electric machines exhibited by the K.K. Hidachi Seisakusho of Tokyo; dry cleaning presser and hydro extractor exhibited by Yamase Tekkosho of Osaka; phonographs exhibited by Paragon Phonograph K.K. of Tokyo; radiators exhibited by Kokusan Honetsu K.K. of Tokyo; building materials exhibited by Sakuma Papuko Kogyo K.K. of Tokyo; traveller equipment exhibited by the Kanai Traveller Seizosho of Osaka: electric lamp valves exhibited by Metro Denkyo K.K. of Tokyo; machine tools and air compressor exhibited by Gomei Kaisha Washino Shoten of Nagoya; valve and pressure gauge exhibited by Yoshihara Shoten of Osaka; building materials exhibited by Nozawa Kosaburo Shoten of Kobe; motors exhibited by the K.K. Yasukawa Denki Seisakusho of Yawata City; the myriagraph exhibited by Horii & Do of Tokyo; mineral oil exhibited by Demitsu Shokai, Shanghai Branch; air compressor exhibited by Washino Shoten of Nagoya; paint, shovels and wire rope exhibited by Ryuki Yoko; cloth hose exhibited by Akao Shoten of Osaka; flour making machinery exhibited by the K.K. Nara Kikai Seisakusho of Tokyo; automobile parts exhibited by the Teikoku Hatsujo Seisakusho of Tokyo; automobile parts exhibited by K.K. Daido Denki Seikosho of Nagoya; wheel, exhibited by Tokyo Sharin Seisakusho; manufacturing machine exhibited by the K.K. Osaka Wakayama Tekkosho of Osaka; refrigerator exhibited by the K.K. Hasegawa Tekkosho of Osaka; photographic equipment exhibited by the K.K. Ishikawajima Zosensho of Tokyo; hardware, exhibited by Toa & Co., Ltd.; radio apparatus exhibited by the Nippon Denki K.K. of Kawasaki; surveying instruments exhibited by the K.K. Tamaya Shoten of Tokyo; whetstones exhibited by the Nippon Kemma Toishi K.K. of Kyoto; water filters exhibited by the Nippon Gaishi K.K. of Nagoya; whetstones exhibited by the Kure Seito Jo Kokura Shutchosho of Kokura City; electric cloth guider exhibited by Korai Koshi of Shanghai storage battery exhibited by the Nippon Denchi K.K. of Kyoto; roll and coupling exhibited by Kokusan Kogyo K.K. of Tokyo; chain block, exhibited by K.K. Matsubara Tekkosho of Nagoya; automobile parts exhibited by the Nippon Piston Ring K.K. of Tokyo; boring machine for mining exhibited by Hasegawa Seisakusho of Yokohama; electric valves exhibited by Toho Yoko of Shanghai; electric tools exhibited by Mitsubishi Denki K.K. of Tokyo; Diesel engine motor exhibited by K.K. Kubota Tekkosho of Osaka, and railway signals exhibited by the Nippon Singo K.K. of Tokyo.



Chain block exhibited by K.K. Matsubara Tekkosho of Nagoya

The entire enterprise has had the backing of the Japanese Consulate-General, The Japanese Commercial Counsellor and the Japanese Chamber of Commerce. The active officials at the head of the Exposition are: President, Mr. Tetsukichi Kurachi, Member of the House of Peers; Vice-President, Mr. Masaji Yoshida, Chairman of the Japanese Chamber of Commerce; Managing Director, Mr. Masaichi Masuda, President of the Japanese Machinery Association.

Japan's Products and Her Raw Materials

(Continued from page 251)

oil and natural gasoline amounted to 2,400,000 hectolitres, imports to 30,000,000 hectolitres and exports to 300,000. The oil-refining industry has developed greatly during the last year or two, and the imports of oil products are being gradually confined to crude oil. When the by-products of imported crude oil are added to the domestic production, Japan may be said to meet 36 per cent of her needs so far as petroleum products for fuel purposes are concerned. Lubricating oil is the most important derivative of petroleum for industrial purposes in Japan. The demand for machine oil depends, of course, on industrial activity; but for general purposes it may be said that home production can only supply 20 per cent of the demand, while the remaining 80 per cent is manufactured from imported crude oil.

Asphalt, paraffin, and carbon black have all witnessed a rise in production, and at present meet 90, 80 and 24 per cent of the demand. Asphalt and paraffin percentages here quoted include the production from imported raw materials, whereas carbon black is a domestic product entirely, and the ratio of self-sufficiency is expected to go much higher.

From the above it will be seen that, although Japan is lacking in natural resources, those that she has have been utilized to a great extent. Her industries have expanded beyond the limit of self-sufficiency in almost every group, but particularly so in the industry using iron and steel, raw cotton, wool, rubber, and petroleum. Japan is looking towards Manchoukuo to supply much of her raw material requirements, as that country, although largely undeveloped, has great potential natural wealth.

Hydraulic Power in Japan

After some years of practical holiday, Japan has resumed construction of water power electric plants. According to the Electric Bureau, work was in progress on twenty-two sites at the end of last year on the erection of plants with a combined capacity of 428,360 kilowatts, of which 420,000 kilowatts will be hydro-electric. Most of the work is expected to be completed by the end of this year. Details follow:—

Companies and institutions	*Power stations and rivers*	*Generating capacity (in kilowatts)*
Railway Ministry	Senju on the Shinano	50,000
Nippon Power	Kurobe No. 2	65,000
Kurobegawa Power	Himegawa No. 6	20,400
Fuji Power No. 2	Yuyama on the Sumata	24,000
Shikoku Water Power	Ichiu on the Soya	7,700
Yahagi Water Power	Taifu on the Tenryu	52,600
Kumagawa Electric	Tamuki on the Kuma	2,390
Kumamoto Electric	Kawabegawa on the Kawabe	6,300
Furukawa Mining	Hosoo No. 4 on the Hime	12,500
Azumi Electric	Himegawa No. 2 on the Hime	12,500
Oigawa Power	Oigawa on the Oi	62,000
Otanigawa Water	Sogagawa on the Soya	3,070
Toho Power	Nagura on the Hida	19,700
Toyama Prefecture	Shogawa No. 1 on the Sho	15,900
Nippon Takugyo	Aimoto on the Kurobe	29,700
Daido Power	Sasado on the Yahagi	9,000
Daido Power	Kasagi on the Kiso	35,000
Nihonmatsu Electric	Otamagawa on the Otama	1,900
Hokkai Water Power	Moiwa on the Shohei	10,000
Shojima Electric	Dam on the Takiyama	2,200
Inaba Water Power	Kuriminogawa on the Kurumino	2,620
Chubu Power	Akechigawa on the Akechi	1,800

Several public organizations under the leadership of the Osaka Chamber of Commerce and Industry have started a drive against electric power control. They claim that the evils of monopoly are emerging, especially among the larger companies. Since a power-buyer cannot switch to another company under the present set-up, service is often extremely bad, the consumers complain.

The New Penang-Hongkong Air Route

Great Four-Engined Airliner "Dorado" of the Imperial Airways Makes the Initial Flight

Of immense importance through all the Far East is the opening of the new Imperial airway linking Hongkong and Penang and this service was definitely established when the great four-engined airliner, "Dorado," of the Imperial Airways made the initial flight from Penang to Hongkong and back in the last week of March. This speeds up transport and mails from all points in the Far East—to London, to Australia, to Africa and to Europe. The scheduled flying time from Hongkong to London since the establishment of the new Penang air route is ten days.

The arrival at Hongkong of the "Dorado" on its first flight from Penang on the morning of March 24, was a historic event and those arriving aboard the airliner were greeted at the Kai Tak aerodrome by a large throng that included His Excellency the Governor, Sir Andrew Caldecott; Harbor Master and Director of Air Services, Commander G. F. Hole; Superintendent of Kai Tak Airport Mr. Eric Nelson, and Mr. M. H. Curtis, Representative in Hongkong of the Imperial Airways.

The great craft on this flight was piloted by Captain J. H. Lock and as Second Pilot, Mr. A. C. Thomas, both veterans in the service of the Imperial Airways and an escort into the Airport was provided by a fleet of six Royal Air Force airplanes from the Aircraft Carrier *Hermes* in Hongkong Harbor. One passenger, the first to make the flight from Penang to Hongkong and return was Mr. Ong Ee Lim, Chinese flying enthusiast of Kuala Lumpur. On its arrival at Hongkong the "Dorado" delivered sixteen bags, 103 pounds of mail. Fourteen of the sixteen bags were from London and one each from Singapore and Penang. The London mail, dated March 14, was delivered at 2 o'clock that afternoon. An informative and interesting description of the flight to Hongkong from Penang was given in a radio broadcast by Captain Lock at Hongkong and this, as published by *The Times of Malaya* follows:

I will do my best he said, to describe the trip, a trip which has put another chapter into the very interesting history of the growth of civil aviation, and has forged another link in that chain of Empire Air Routes joining up all the points in Britain's far-flung Empire; a chain which we hope ultimately will encompass the world, bringing all places within a few days of the Home Country.

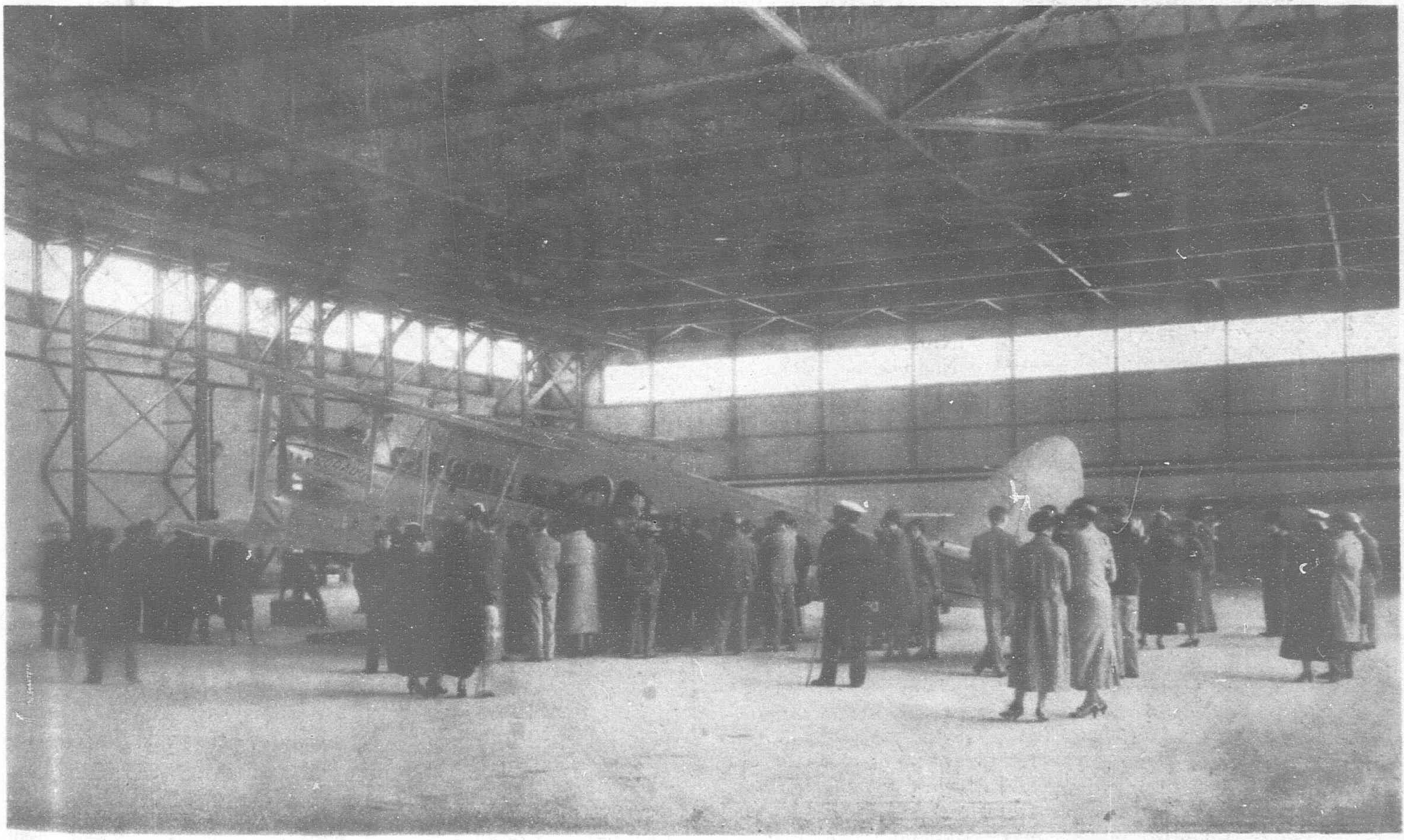
Jules Vernes' well-known novel "Around the World in Eighty Days," thought so ridiculous a few short years ago, has now become an accomplished fact, and in the not too distant future it will be a thing of everyday occurrence, a thing which our children will accept in the same way as we ourselves have accepted the train and motor-car, derided and ridiculed so by our grandparents.

I cannot over-emphasize the importance of Hongkong in that chain of Empire Airways and I am fully appreciative of the honor bestowed on me in being the Commander of the first aircraft to bring His Majesty's mails to Hongkong, but I am side-tracking the main issue.

The Start

Let me try to describe to you the trip itself. Just as the first rays of dawn were appearing in the Eastern skies we took off in the Royal Mail Aircraft "Dorado," bound for Hongkong with our first load of mail.

Circling the aerodrome, we see the twinkling lights of the few early risers in Georgetown, the port of Penang. Then setting our course to the north-east we see in the Straits separating the island from the mainland, the riding lights of the ships lying at anchor there. Crossing the coast in the half light of dawn we see vast expanses of rubber plantations, for are we not passing over the home of the rubber industry? Looking down on it now it seems unbelievable that it was a little over sixty years ago that the first rubber tree was imported, or rather smuggled into Malaya from



The Airliner "Dorado" in the Hangar at Kai Tak Airport in Hongkong after arrival from Penang, March 24, 1936

Ceylon. Looking on them now, stretched as far as the eye can reach, one feels that they have been there since the beginning of time.

Climbing steadily we soon leave the rubber plantations behind and pass on to the jungle covered mountains, the home of the jungle tribes of Malaya, now rapidly dying out under the march of civilization, but who can still be seen in places, hunting their food with their long blow-pipes and darts.

Just over an hour's flying from Penang brings us to the sandy shores of the east coast of Malaya, to the little town of Kota Bahru, nestling in among the coconut palms on the banks of a wide winding river. When one sees these little townships, one wonders what the people do there, what sort of a life they lead.

Crossing the coast at the mouth of the river, we set out on our 250 mile sea trip across the Gulf of Siam to Indo-China.

In a little over one and a half hours' flying we see in the distance the outline of the Cape of Cambodia, and crossing the coast of French Indo-China we cross over the flat plains with their myriads of canals and rivers, with paddy fields stretching away into the distance and so to Saigon, our first port of call.

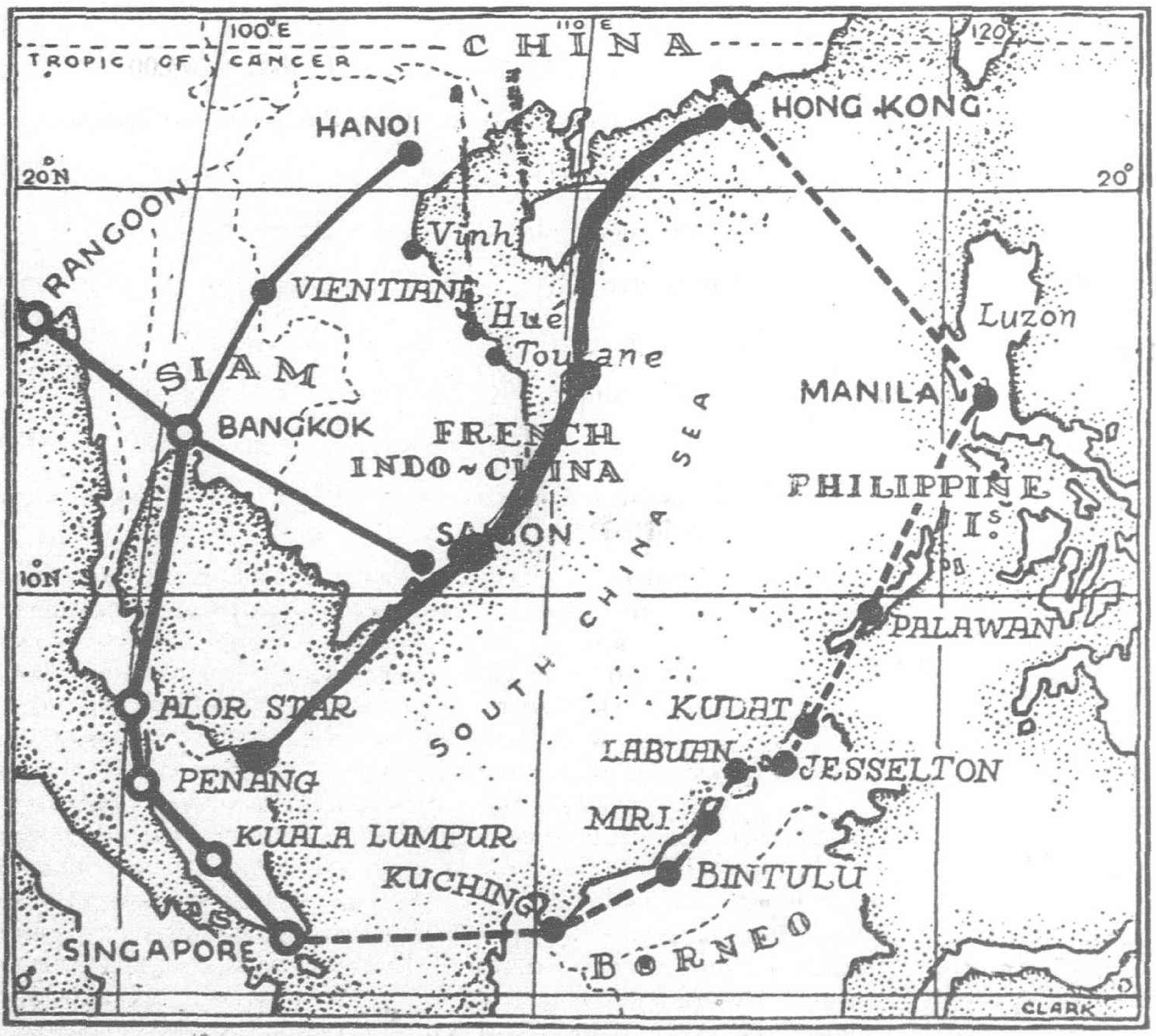
Group taken on arrival of the "Dorado" at Hongkong, March 24, 1936, on the initial Penang-Hongkong flight. Left to right: First Officer, A. C. Thomas; H. E. The Governor, Sir Andrew Caldecott; Captain J. H. Lock; Commander G. F. Hole, Director of Air Services

Here we draw up on the tarmac and no sooner are the engines stopped than the process of refuelling is commenced and the passengers and crew go off to the Aero Club of Indo-China for lunch where we met Monsieur Van den Born, the first man who ever flew in Hongkong in the year 1911. He now lives in retirement at Saigon, where he still takes keen interest in aviation and still flies himself.

After refreshing the inner man and quenching the enormous thirst of the "Dorado" with countless gallons of petrol, we find ourselves on our way again, having been three-quarters of an hour on the ground; no time to visit the town of Saigon, with its typical French boulevards and open air cafes. This pleasure must wait for another day, for His Majesty's mails must go.

Next Port of Call

We set course, therefore, for Tourane in Annam, our next port of call.



Map showing Far Eastern Air Routes showing relation of the new Penang-Hongkong airway to other routes

Leaving the winding river on which Saigon lies, we set a northerly course over cultivated lands and rubber estates. Very quickly the cultivation gives way to jungles, and the ground begins to rise towards the lowering mountains in the distance, and we begin to climb too.

The weather becomes cloudy and we climb up into the blue skies above, from which position we catch glimpses of the jungle covered mountains below. It is said that this jungle contains more wild animals to the square mile than any other part of the world, and looking down into it, in its sinister grandeur, we feel relieved that the days of forced landings are passed and over.

We climb up to 12,000 feet to clear the mountain peaks of the Coldesnuage, which encircles Tourane, most aptly named, for are they not always covered in clouds?

Over Annam

Passing across these we spy below us, through a gap in the clouds, a glimpse of water, and gliding gently down as we come out beneath the clouds, we see spread before us the coast lines of Annam, with the town Tourane nestling in the bay.

We alight at the aerodrome and having seen "Dorado" fed and safely tucked away for the night, we proceed into town for a night's rest, prior to our final jump across the China Sea to Hongkong.

Dawn again sees "Dorado" straining at her leash ready to be off, and on the stroke of six we leave Tourane and set across the open sea.

The first point we strike in China is the island of Hainan, and flying along its rugged shore for some hundreds of miles, we check up our speed and position, and calling up Hongkong, we tell them we shall be arriving at 11.30.

As we look over the side we see three very large sharks disporting themselves in the water, and one feels that an aircraft is even safer than a ship, because you are farther away from them.

Dead on 11.30 we pass over Magazine Gap and see spread before us the glorious panorama of Hongkong harbor, with Kowloon in the background, a mixture of the north Devon coast and Scotland.

As we fly over the town we are greeted by a squadron of aircraft from *H.M.S. Hermes* and so we come to Kai Tak Aerodrome, where we land and are greeted by His Excellency the Governor, and so ends the first air mail flight to Hongkong, which is I trust, the forerunner of many others, and I am perfectly confident in saying that in a matter of a couple of years aircraft will be the means of transportation of all first class mail matter, and a considerable amount of passengers and goods, and it will be possible to reach London from Hongkong in under the week.

The Imperial Airways

The announcement of this regular weekly service between Penang and Hongkong, following so closely the recent extension of Imperial Airways from the main African trunk route (whereby Khartoum is now regularly linked up with the west coast of Africa), brings into strong relief the quiet and unobstrusive expansion of British air interests throughout the Empire.

The task undertaken by the National Company (Imperial Airways and its associated and subsidiary companies) is no mean one. It is no less than the task of ultimately linking up by air the whole of the great structure of the British Empire. Apart from the pioneering work involved, the experimental flights, the collating and sifting of meteorological data and the organization of innumerable details preparatory to the opening of a new route to the public, there are intricate matters of a diplomatic nature to be tackled whereby the transit of foreign countries *en route* may be effected with efficiency and good-will.

It is only after four and a half years of involved political negotiations that a happy conclusion has been brought about, which now enables Hongkong to be brought within 10 days of London and to within six to seven days of the main cities of Australia; and with this newly formed link no vivid imagination is required to assess its value to the British Empire in terms of letter airmail and the general speeding up of the Imperial communications; without taking into consideration the value to the Chinese community, whether in China, Malaya or Siam, of a service which will bring into closer contact the extensive commerce which their large population in these areas so naturally sustains.

The airmail demand for the new route—which provides an immediate connection at Penang with the main Imperial trunk route between London and Singapore and *vice versa*—is confidently anticipated to be such as to require that the bulk of the available space will be reserved for the carriage of letter airmail. Nothing but the first few weeks of the new service can demonstrate its potential value to the airmail user, and such accommodation as may later become available for passengers will be at very economic rates; the single fares have been fixed at Singapore/Hongkong £35, Penang/Hongkong £30 and London/Hongkong £175, intermediate fares approximately corresponding in proportion.

Short Cut to China

Penang as an airport center is basking in its rapidly increasing importance; it is scarcely six months ago since Bayan Lepas Aerodrome was formally declared open for civil use and by reason of its geographical position it has proved that it will provide for mail and passengers at least that short cut to China which supporters of the Kra Canal project dream of, but without the cost or the engineering difficulties.

As a further stage ahead in a well-defined program of civil air transport development, it is confidently expected that Malaya will open in the comparatively near future a civil airport at Kota Bahru on the east coast. This not only indicates the possibility of opening up the east coast in relation to local plans for an internal Malayan service but it will contribute also to the more convenient operation of the Penang-Hongkong route. The latter, meantime, is necessarily operated in long stages, some of which involve sea crossings, which in turn, demand a very high margin of fuel reserve.

Kota Bahru as a regular port of call on the Hongkong route will prove invaluable not only as a landing and refuelling point but also for the dissemination of weather reports. How essential these reports are will be readily appreciated when it is realized that the greater part of the country to be flown over between Penang and the east coast of Malaya is mountainous and uncharted, that further east there is approximately 300 miles of sea to be crossed between the east coast of Malaya and the nearest coastal point in French Indo-China and that before Saigon, the first port of call, is reached, the aircraft will have flown some 600 miles from Penang.

Arrangements recently were completed for the duplication of the service between Singapore and Brisbane operated by Qantas Empire Airways Ltd., the associated Company of Imperial Airways Ltd., operating that sector of the through England-Australia service.

This duplication began with the eastbound service leaving Singapore on Friday, May 15, and in the westbound direction the first duplicated service left Brisbane on May 16.

Thereafter a twice weekly service opened in each direction, leaving Brisbane westbound on Wednesdays and Saturdays, and Singapore eastbound on Mondays and Fridays, connecting in each case with the eastbound and westbound duplicated Imperial Airways services to and from London; the Hongkong-Malaya service connects at Singapore, of course, with the Saturday arrival westbound and the Monday departure eastbound.

Concurrent with this increased frequency of services, the fares and freight rates between Singapore and Brisbane were considerably reduced, resulting in a consequent reduction in the through rates from Hongkong, the inclusive Hongkong-Brisbane fare being £87.

Hongkong-Penang Route Time Table

The service is operated once weekly in each direction to make connection at Penang with the through England-Australia service, as follows :—

FRI.	11.00	dep.	↓	HONGKONG	↑	arr.	11.30	TUES.
	Aft.	arr.		TOURANE		dep.	06.00	
SAT.	06.00	dep.		*TOURANE		arr.	Aft.	MON.
	10.00	arr.		SAIGON		dep.	12.00	
	10.45	dep.		SAIGON		arr.	11.15	
	Aft.	arr.		PENANG		dep.	06.00	

connecting with England-Australia service as follows :

1. TO AND FROM ENGLAND

SUN.	10.00	dep.	↓	PENANG	↑	arr.	12.00	SUN.
MON. week	Morn.	arr.		LONDON		dep.	12.30	SAT. Week previous

2. TO AND FROM AUSTRALIA

SUN.	12.45	dep.	↓	PENANG	↑	arr.	Morn.	SUN.
THURS.	Aft.	arr.		BRISBANE		dep.	07.00	WED.

* *Note :* Hue is an alternative port of call to Tourane at the Commander's discretion.

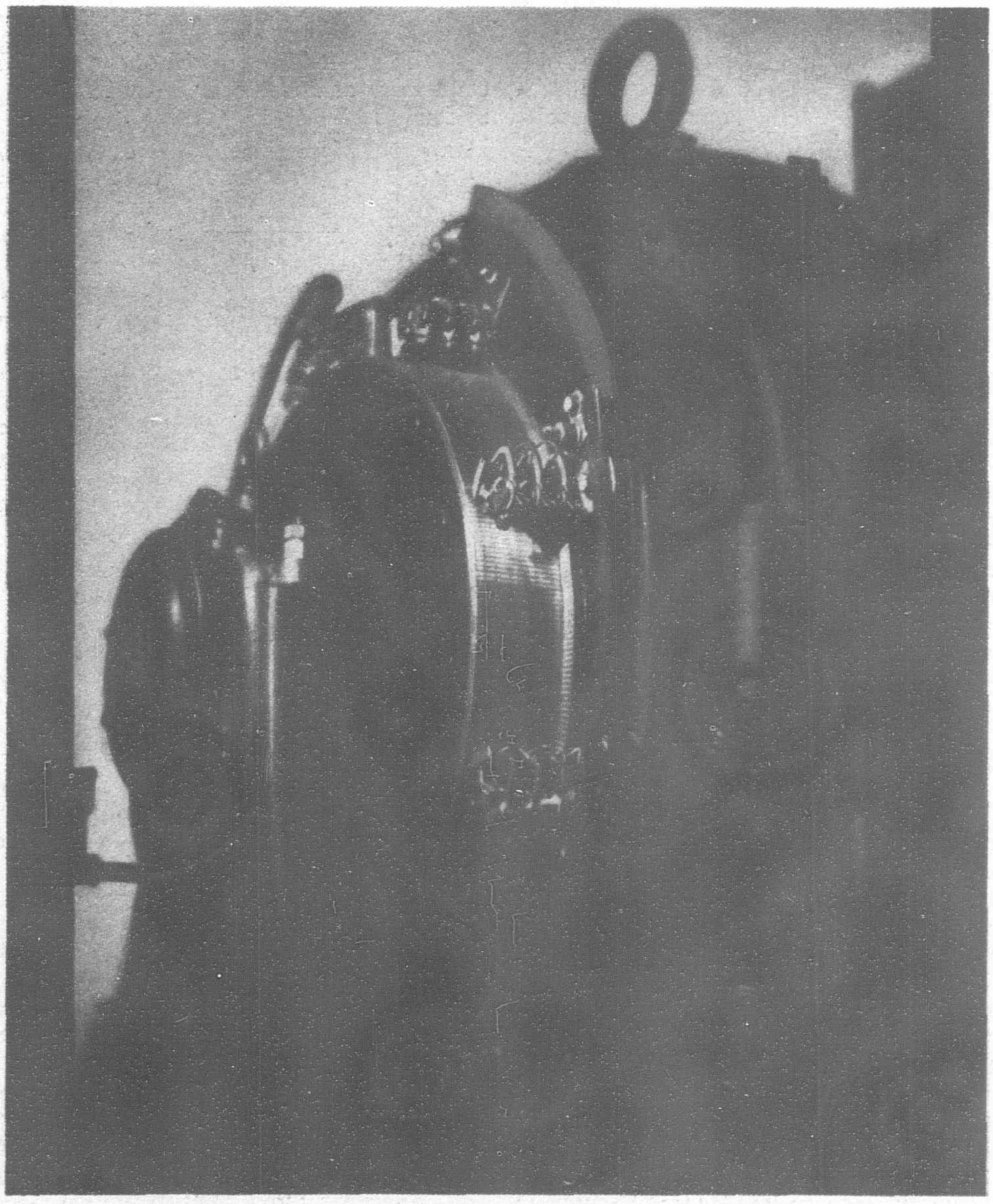
Thus the transit time from Hongkong to London is ten days, and to Brisbane six days. In addition to providing a connection with the countries and territories served by the England-Australia line, the service also links Hongkong with the South Africa route, and with the network of airlines operating in and from Europe.

In accordance with Imperial Airways' policy of using four engined aircraft on all the main Empire routes, the D. H. 86 type, (known as the "Diana" class in Imperial Airways), is employed. This aircraft is powered with four Gipsy Six engines each developing two hundred horse-power, on any two of which it can maintain height with full load. The D.H. 86 type is being extensively used with great success by Imperial Airways and associated companies in Europe and on the Singapore-Brisbane sector of the Australia route. The service is available for the carriage of passengers, freight and mail, although at present traffic cannot be picked up or set down at Indo-China ports.

Modern Elevators in the Far East

With regard to the matter of transport in all its varied phases it is a bit singular, perhaps, but in keeping with actualities, to learn that at any given minute of the ordinary business day in the large centers of the Far East, in Tokyo, for example, or in Shanghai, just about as many people are moving up and down, vertically, as are moving in conveyances on a horizontal plane over the surface of the earth. A reason for this state of affairs, which exists commonly in most of the populous portions of the planet, may be traced back some eighty-odd years when an American inventor climbed to a platform that could be moved up and down between guides and was hung about forty feet above ground in the perpendicular shaft formed by the guides, suspended there by a rope. While an avid and wide-eyed throng looked on the inventor had an assistant at the top of the shaft above him cut the rope to which the platform was attached. From this historic event as an original cause we come down through the decades to the logical consequence of modern times reflected in the circumstance that the population on the move through the business day in almost any large urban center—in trains and trams, taxis and omnibuses—measures to just about the same total as the number of persons moving up and down in elevators—or, as the British more aptly have it—in lifts.

When the mechanic cut the rope holding up the inventor on the suspended platform and the throng below stood breathless awaiting the smash—it didn't happen. The platform shifted perceptibly, then stayed put. The inventor climbed down by means of a ladder. This was Elisha Graves Otis of Yonkers, New York, and the test demonstration that he held, which took place at the Crystal Palace Exposition, brought into being the first "safe elevator." The small structure at Yonkers in which the inventor worked and in which in 1852 he perfected his invention of the first safe elevator has grown into the great modern plant of the Otis Elevator Company of to-day.



The Otis gearless traction machine which provides the intensive high speed elevator service with safety without which modern skyscrapers would be impossible

The First Elevator

Just when the first crude elevator was invented probably will never be known. As early as 40 B.C., Vitruvius, the Roman architect, military engineer and writer, described an apparatus built by the Greek Archimedes in 236 B.C., which consisted of a windlass, rope, and pulley operated by manpower and used apparently for hoisting both freight and persons from one level to another. Nero's palace, according to archæologists, contained three lifts, similar in principle to Archimedes' and designed out of necessity to transport the obese monarch from one level of his palace to another.

The first great difference between elevators in their earlier and later stages of development lay in power. In the beginning steam power was used, and afterwards, hydraulic. In its original form the hydraulic mechanism consisted of a cylinder only a few feet long containing a piston, which were attached the sheaves. The lifting ropes passed over these sheaves to the car, and motion was given by the operation of hydraulic power through the piston. As soon as this hydraulic elevator had been perfected, taller buildings were immediately constructed, and a considerable increase in elevator business resulted.

Not content with the satisfactory operation of the hydraulic elevator, the Otis interests developed the electric elevator. The first successful installation was made in 1887, and continued in service for 35 years. A large drum was used, to which the ropes passing to the car and counterweight were rigidly fastened. The speed of this type of elevator was limited to 400 feet per minute, and it could not be used for very high buildings because of the long drum which would have been necessary. Therefore, for many years after this time, the hydraulic elevator continued to be used in the higher buildings. In the year 1904 the last major difficulty in connection with electric elevator operation was removed by the development of the gearless traction elevator. This type, greatly refined and developed, is now used in the world's tall buildings and many have been installed in the Far East.

Otis First in Far Eastern Field

With the growth and development of industry in the Far East and the modernization of business procedure, came also concentration of headquarters and larger organizations, all of which demanded buildings of considerable size. With this came the need for modern vertical transportation, and a constantly increasing number of buildings were erected and there was a corresponding increase in the number and the speed of the elevators. The first modern elevators to be installed in Japan and China were of Otis make, but with the constantly expanding market other foreign firms have entered the territory.

Through this period and up to the end of 1929, the agency of the Otis Elevator Company in the Far East was held by the American Trading Company. But by this time the new trend in building in China and Japan, and particularly in Tokyo and in Shanghai, was so apparent that the company realized it could adequately serve the local buying public only by means of a branch office. From the beginning of 1930 therefore the Otis Elevator Company has had its own establishment and plant in Japan and its branch establishment and office in Shanghai managed by the Mitsui Bussan Kaisha, and through these years elevator equipment valued at many millions of dollars has been imported into Japan and China and has been manufactured in Japan.

One of the most important early improvements in elevator operation, is what is termed "Micre-Drive"—the self levelling feature. By means of this device, it is necessary only for the operator to bring his car somewhere near the floor, making an ordinary stop. The self-levelling mechanism then takes hold and stops the car at such a point that the platform is exactly even with the corridor floor.

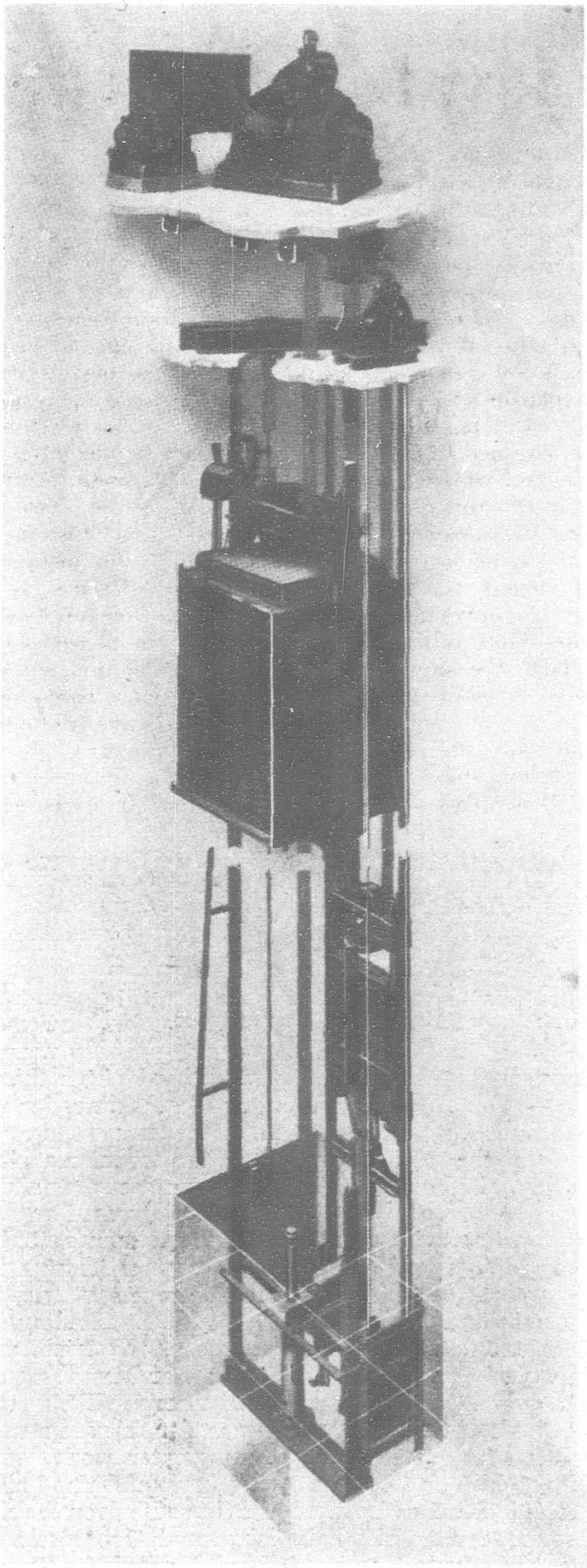
Automatic Stop

By means of a still further refinement, it is unnecessary for the operator even to stop near the floor. He has but to wait until the door has closed (which is done automatically by an electric motor) and the car has reached full speed, and then center his operating switch, upon which the car will proceed at full speed until somewhere near the next floor, when it will automatically slow down and stop at the exact floor level. This method of control is known as "Flying Stop," and has been installed in a considerable number of important buildings in Japan and China.

Fully automatic control has been known for many years; it is usually termed "Push Button Control." With this method the car will proceed to any floor at which a passenger is waiting, and will proceed to any other desired floor, at the mere pressure of a button. The original form of this control possessed certain inherent disadvantages, chief of which was the fact that the car, once in operation, was monopolized by the passenger using it until he had reached his destination, left the car and closed the gate and door. This has in recent years been greatly improved by "Collective Automatic Control," by means of which the car will automatically stop and pick up all waiting passengers in both directions of travel, thus greatly economizing current and pleasing passengers by reducing their waiting time.

The Otis organization in 1924 developed "Signal Control," and elevators operated with this system are manufactured complete and have been installed in many buildings. This is a robot with seemingly human intelligence. Until the development of Signal Control, despite the fact that acceleration, deceleration and levelling had been cared for automatically, at speeds of over 700 feet a minute it became physically impossible for an operator properly to control his car manually. This new means of elevator control made it possible to run between 700 and even 1,200 feet a minute and have the elevator fully under control. With this system the operator pushes a button for the designated floor and when the car get there it stops automatically.

The highly refined mechanism relieves the operator's mind of remembering anything but to press the proper button. Mechanically each floor of the elevator shaft is reproduced in miniature in the machine room at the top of the building. A metal shoe plays the part of the elevator and moves up and down in the miniature shaft as the car moves. Each floor of the miniature shaft is connected by an electric switch with each floor of the regular shaft. When one of these contacts is energized it sets machinery in motion which first slows down and then stops the car. If certain contacts are not energized they have no effect whatever. Thus when the attendant presses the button marked "Floor 10" while the car still is at street level, the effect is to energize contact point 10 in the miniature shaft. As the car travels upward its counterpart also travels upward. Points not charged with electricity are passed. As soon as the contact shoe in the miniature shaft reaches point 10, it sets up a current which slows the car and eventually brings it to a smooth stop at the tenth floor.



Typical Otis signal control installation

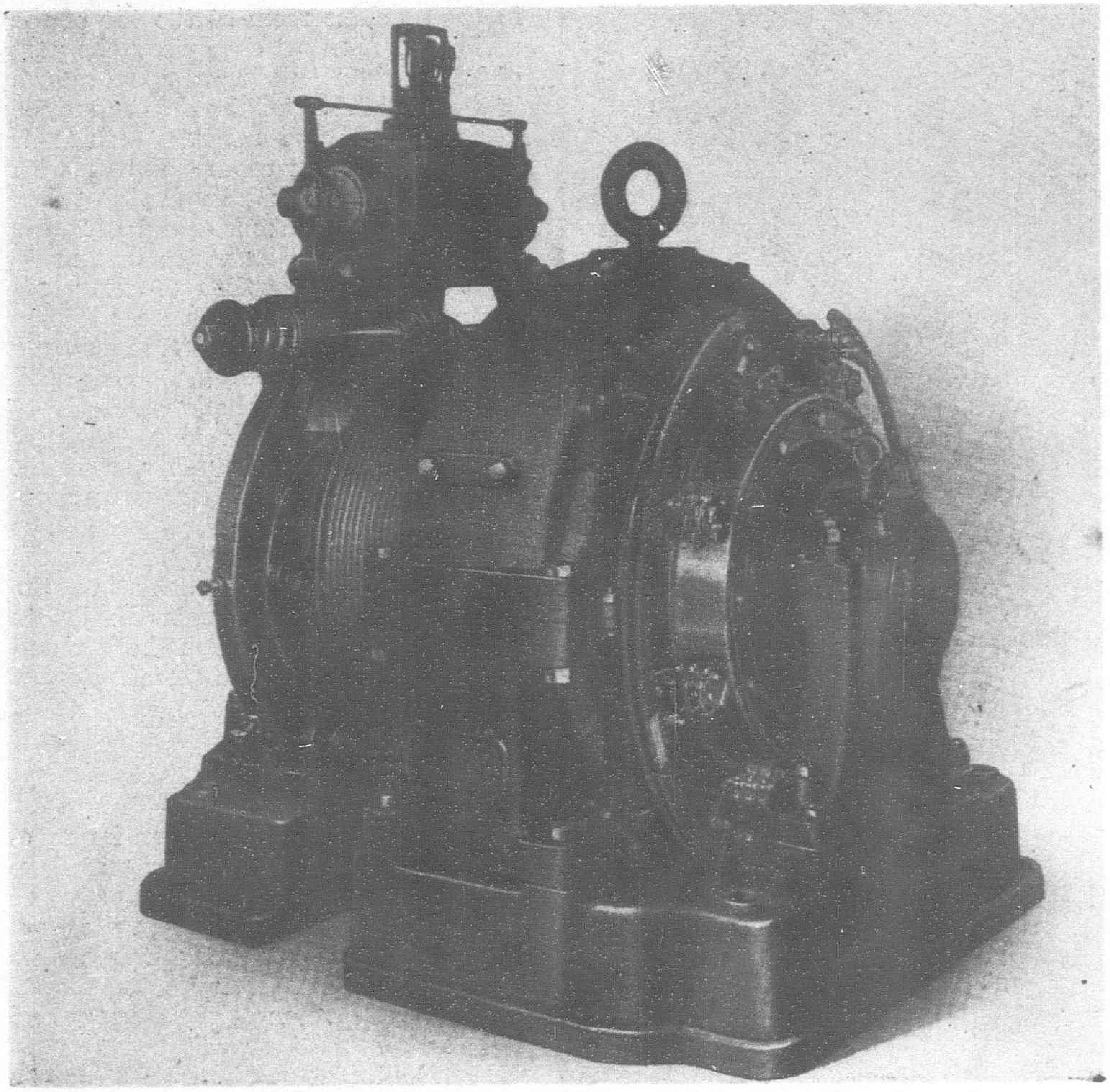
Faster and Faster

In line with these other improvements there has been a steady increase in the speed of passenger elevators in the past thirty-five years. In the early days of this century, although there were passenger elevators that went as fast as 600 feet a minute, most of them averaged 200 feet a minute, or a little more than two miles an hour. Prior to 1931 no elevators ran at a higher speed than 700 feet per minute, but to-day in the United States a speed of 1,200 feet a minute, or about 13.6 miles an hour is the usual rate in new high tower buildings and elevator engineers predict even higher speeds for the future.

A development along somewhat different lines is the modern escalator. The first escalator was manufactured by the Otis organization early in the present century and consisted in principle, as it does to-day, of a complicated arrangement of stairs motivated by an electric motor. The older types of escalators have outlived their usefulness, and the Otis company now is installing a new type which is absolutely noiseless in operation, possesses speed as high as can comfortably be borne by its passengers, and is styled in accordance with modern trends. It moves silently and with exact precision on its canvas-cushioned wheels, and its modern treatment of balustrading with extruded mouldings and plywood panels offers important architectural advantages.

Lifts in Shanghai

The fastest and the highest climbing elevators in the Far East are in Shanghai in the great structure overlooking the Race Course on Bubbling Well Road which houses the Park Hotel, shown in an accompanying illustration. The three lifts in service in this hostelry travel from the ground to the 17th floor, a total distance of 217 feet, serving a total of 18 stops and 18 openings. These elevators travel at a speed of 600 feet per minute and are operated by "Signal Control." The largest passenger elevator in Shanghai, the roof garden elevator in the New Sun Department Store, carries 24 people weighing 3,600 pounds as easily as the early steam type elevator lifted its operator and one or two passengers—and much more rapidly and quietly. These figures are not very impressive



Motor-end view of the Otis gearless traction machine...The motor is an integral part of the machine, designed and built especially for elevator service

when compared with an elevator in Rockefeller Center in New York City, which climbs 1,400 feet a minute,—about 16 miles an hour, and with a freight elevator in the Empire State Building which rises 968 feet from the sub-basement to the 86th floor, but the elevator industry is in its infancy and waits only on the erection of more and higher skyscrapers.

In Shanghai about a thousand elevators are in service and it is estimated that they travel four thousand miles daily in transporting about 300,000 passengers. It is believed that the first elevator installed in Shanghai was of German manufacture and was placed in service nearly a half century ago in the structure at the corner of Jinkee Road and the Bund which through many years housed the German Club, a property that was taken over by the Chinese Government and for a time was used by the Bank of China. The building was demolished in 1935 in preparation for the erection on the site of the new Bank of China building which will cover a vast area facing the Bund and is to be erected at an estimated outlay of $13,000,000. The contract has been let for the installation in this new structure of elevator equipment as modern as any in the world by the Otis organization. A detail in connection with this installation, not yet in use anywhere in the Far East will be the Otis scheduling device for banks of cars by means of which arrival and departure of cars will be controlled mechanically much as movements of railway trains are controlled by train dispatchers.

Shanghai's oldest elevator of German manufacture was demolished last year when the building that housed it was torn down. It is said that the oldest elevators remaining in service in the great Chinese port are those in the Astor House and the Palace Hotels. These have been carrying patrons of the two hotels up and down for the past thirty-one years.

The only escalators thus far installed anywhere in China are in Shanghai in the recently opened Sun Department Store on the corner of Nanking and Thibet Roads. These escalators were installed along with other extensive Otis elevator equipment. The Sun Department Store is undoubtedly the most modernized retail establishment of its kind in China and when the first four stories and basement that the store occupies of the ten floors of the building were opened it is noteworthy that the escalators between the first and second and the second and third floors were the main attraction for the throngs that attended the opening. In the first several days of this opening, in fact, the Management of the store found it necessary to impose a nominal admission charge to cope with the thousands that sought to visit the establishment. A number of escalators are in service in commercial establishments in Japan. One of these shown in an accompanying illustration, in the Mitsukoshi Department Store at Tokyo is similar in general respects to the escalators in the Sun Department Store in Shanghai.

Shanghai's Building Era

A tremendous amount of new construction in the form of taller buildings than have ever hitherto been erected in the Far East has been in progress in Shanghai through the past fifteen years and, particularly, through the past decade. Within this period, in fact, the sky line in the business section of Shanghai, and in many outlying portions as well, has been utterly transformed. Disorders of one kind and another and the uncertainties of commerce and life in the interior of the country have made Shanghai with its ordered government a natural reservoir into which the bulk of the wealth of all China has drained. With ordinary commercial outlets for investment largely closed by depressed business conditions the flood of stored treasure in Shanghai, primarily seeking security while finding employment has been diverted into new construction, uprearing vast towering structures literally by scores in this great center of population—the world's fifth port with a population now nearing four millions. And despite continued hard times this great building era in Shanghai shows no signs of subsiding, for the conditions that brought it about have not been changed in any essential way in China.

Elevator interests have claimed their full share of this outpouring of hundreds of millions, for the new construction in Shanghai is essentially modern to the last detail and architecturally high grade in design, materials and equipment. To name at random but a few of Shanghai's new tower buildings the Cathay, Park and Metropole Hotels, the Broadway Mansions, Hamilton House, Development Building, Wayfoong House, Grosvenor House, Cathay Mansions, the Embankment House, largest apartment building in the Far East, and scores of other huge apartment buildings, particularly in the western district of the city and in the French Concession, all are structures calculated to arrest attention. And even greater works are planned in the immediate future. The new Bank of China building, another great office building to house the Chase Bank on the city's main business thoroughfare at Szechuen Road and, two blocks farther west on Nanking Road at Honan Road, a new huge structure of the Hardoon interests are in course of construction.

Developments in Japan

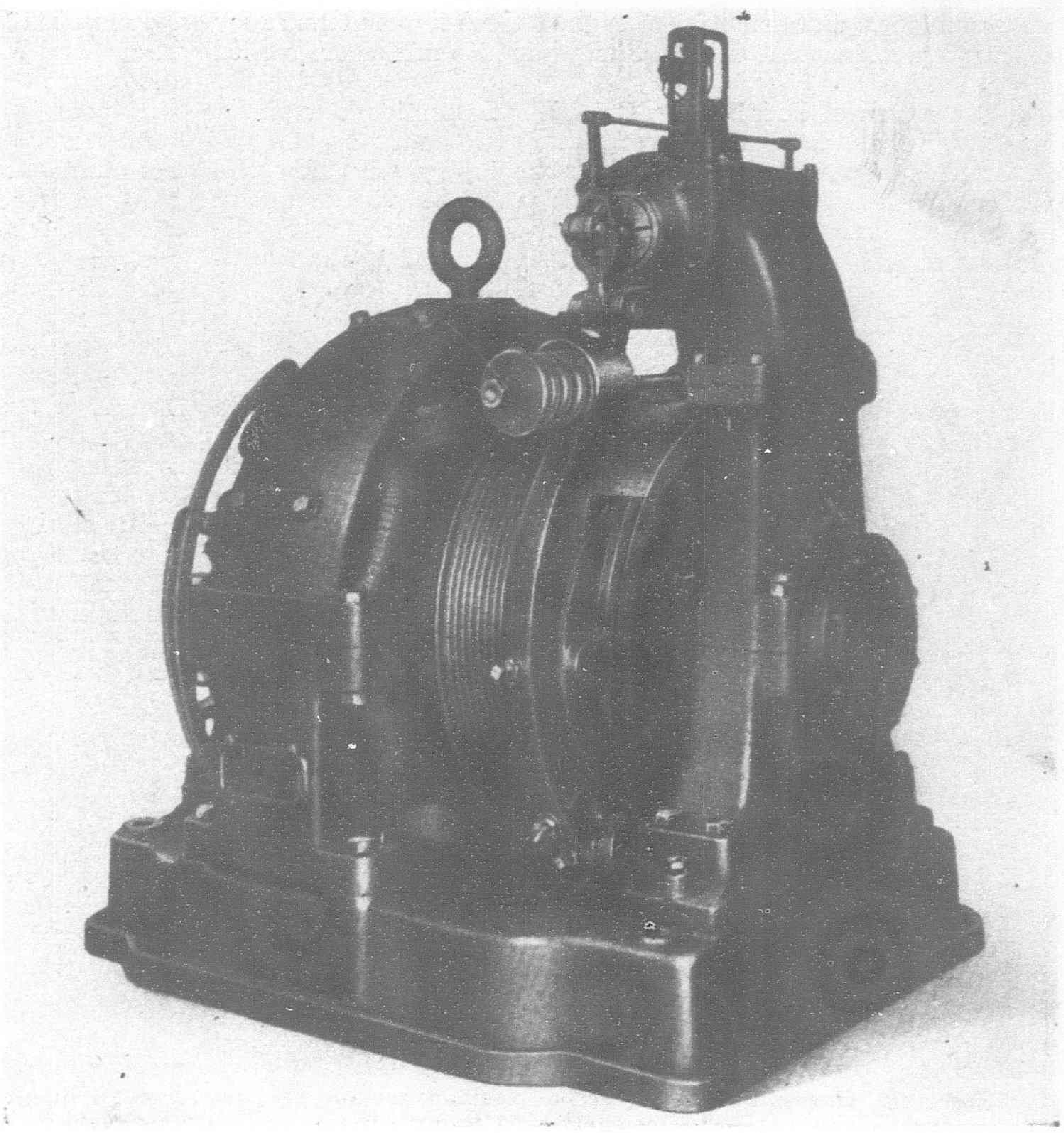
The growth and development of industry in Japan and modernization of business demanded buildings of considerable size. However, due largely to the frequent severe earthquakes, tall buildings were not at first considered. Later, however, as the result of scientific research, stimulated by the increasing value of property, earthquake-proof buildings of several stories were constructed. With this came the need for modern vertical transportation, and a constantly increasing number of buildings were erected up to the maximum height allowed by law—33 meters above street level—and there was a corresponding increase in the number and the speed of elevators.

The first modern elevator to be installed in Japan was one of Otis make, but with the constantly expanding market various other foreign makers entered the territory. Also many local makers attempted to secure a share of the business, among the most prominent of which was the Nippon Elevator Company.

From the beginning of 1927 until the end of 1931, the Otis Elevator Company has had its own branch office in Tokyo, managed by the Mitsui Bussan Kaisha. Even from the beginning of this period, however, the Otis Company foresaw the demand for equipment manufactured in Japan, by a Japanese company, and accordingly on January 1, 1932, it closed its offices and transferred its interests to a newly founded Japanese Corporation, the Toyo Otis Elevator Kabushiki Kaisha, owned partly by Mitsui Bussan Kaisha and partly by Otis Elevator Company.

This new corporation lost no time in erecting a modern manufacturing plant, in which only the most up-to-date machinery and equipment were installed, and which within a year began to supply elevators to the local market. During the years which have passed since, this company has served an ever-increasing clientele, and has fully maintained the reputation for high quality established by its predecessor. This was, of course, only to be expected, since the new company has availed itself of all the advantages of elevator engineering and design developed by the Otis Company over a period of some 85 years, and is constantly supplied by that company with the results of its current research and improvement. Furthermore, high class materials have been made available to building owners at prices only slightly higher than are demanded by suppliers of admittedly inferior local equipment.

In addition to the manufacture of elevators proper, i.e., the machinery, controlling equipment, safety devices, etc., the Toyo Otis Elevator Kabushiki Kaisha produces also those parts which are more commonly noticed by the public—the cars and entrances. While the perfection of such parts has little to do with the safe operation of the elevator, it nevertheless, far more than generally realized, contributes to the general quietness and smoothness of operation, and in no small way affects the architectural beauty of the building. To this end the Toyo Otis Company has installed metal-working machinery and finishing equipment by means of which it is able to turn out cars and entrances of a quality and appearance far superior to those produced by any other manufacturer in Japan.



Brake-end view of the Otis gearless traction machine, showing the compact construction of the machine and the accessibility of all operating parts

It is the policy of the Toyo Otis organization to manufacture all elevator parts under its own roof and to bear entire responsibility for their beauty, smoothness and quietness of operation, and above all for the safety of the entire equipment. The buying public has recognized this quality in Toyo Otis equipment, and as a result that company and its predecessor have supplied all the more important installations in Japan, such as the large insurance companies—Meiji Seimei, Tokyo Kaijo Nisshin Seimei, Chiyoda Seimei, Nippon Seimei ; the important department stores—Mitsukoshi, Takashimaya, Sogo, Matsuya, Matsuzakaya, Daimaru, Hankyu ; the more important banks—Mitsubishi, Yasuda, Kawasaki Dai Hyaku, Nippon Ginko, Yokohama Specie, Manshu Chuoh Ginko, Daiichi, Chuoh Kinko ; the larger business buildings—Sumitomo Building, Osaka Stock Exchange, Sanshin Building, Osaka Gas Building ; ocean-going vessels—*Asama Maru*, *Tatsuta Maru*, *Chichibu Maru* ; hotels and hospitals such as the New Osaka Hotel, Imperial Hotel, Fujiya Hotel, various Red Cross hospitals, St. Luke's Hospital ; race clubs—Nihon Race Club and Nakayama Keiba Club ; and many other important buildings as well as a great number of smaller ones.

At the beginning the Toyo Otis Company manufactured only the simpler types of elevator machinery, but it was soon found that the local market required equipment fully equal in refinement to that made in America, and superior in this respect to the materials required by the European market. Consequently, the manufacture of gearless machines with " Unit Multi-Voltage " control was instituted in Kamata, thus placing this plant on a par with any other elevator plant in the world.

Types of Equipment

One of the most important early improvements in elevator operation, and one which is incorporated in practically all the more refined types of equipment turned out by the Toyo Otis plant, is what they term " Micro-Drive "—the self-levelling feature.

While the Otis Elevator Company of America was the pioneer in the elevator field in Japan, its successor, the Toyo Otis Elevator Kabushiki Kaisha, a Japanese Corporation managed and largely owned by Japanese, has taken up the burden and is to-day the leading manufacturer of verticle transportation equipment in the Far East. Furthermore that Far Eastern buying public has the satisfaction of knowing that as fast as any major improvements are made in elevator equipment abroad such advances will be reflected in the Far Eastern products, and no owner need ever feel that he is in danger of being sold material which is not up-to-date in every respect.

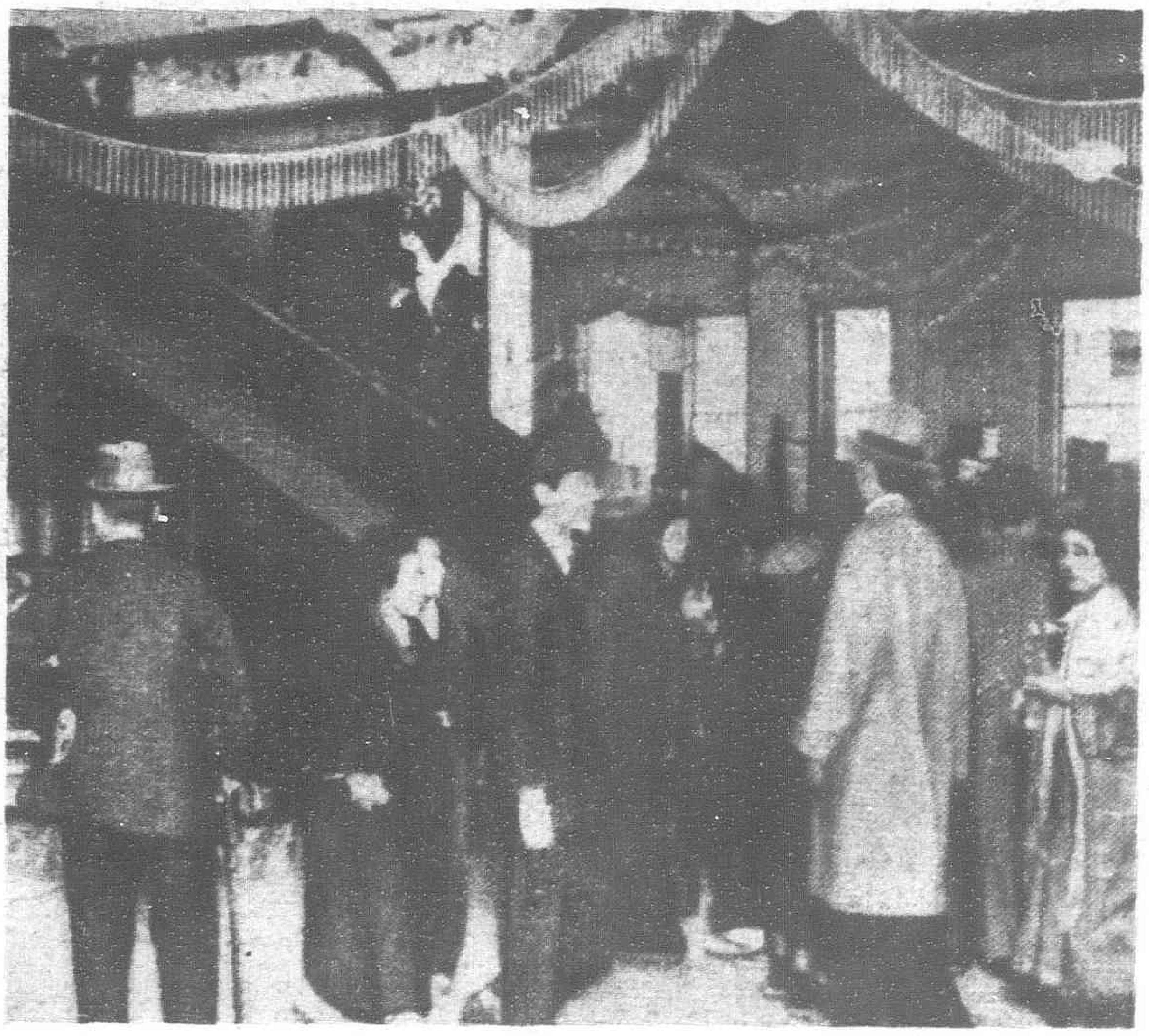
It is a commonly recognized fact that the success of a commercial building of this day and age depends to a great extent upon the character of its lift system as compared to that of the various buildings around it. To such an extent is this true that modern buildings are possible only through development which has produced the modern lift. The skyline of any large modern city being held up as it were by the lifts—the tall buildings being merely lift wells surrounded by walls and rooms. The development of lifts to their present day state has, however, been a long drawn out process, keeping pace with (often in advance of) the development of other means of transportation.

When it is realized that the lifts in a city such as New York convey as many passengers as all the other means of public transport combined, it is readily seen that development has had to keep pace with the ever increasing number of persons employing the lifts. Lift transport is by far the safest means of transportation in use at the present time, elevator accidents being of great rarity and, when occurring, attracting a great amount of attention. Figures put out by the Management Division of the Real Estate Board of New York might be of interest in this connection. These figures show that some three million more people are served daily by elevators in New York city than are carried by all the horizontal transfer systems combined ; including subways, street cars, elevated trams and buses. Some twelve million three hundred and fifty thousand persons travel daily in lifts, while nine million are carried otherwise.

The report of P. F. Toley, Chief Lift Inspection Bureau for Manhattan shows but one fatality for every two hundred and sixty-five million persons carried and but one injury per thirty-nine million five hundred. In other public traffic, fatality is one in fourteen million and injury one in sixty-six thousand, or a ratio in favor of lifts of nineteen to one and six hundred to one respectively.

A Triumph of Engineering

Every branch of engineering science has entered into the development of the lift; from the original steam machine to the present day automatic lift is a long step and some of the best engineering minds of the century have aided in the taking of it. The first and most important question to be answered was that of safety. It was comparatively easy to hitch a small steam engine to a winding drum and by means of a hemp rope haul a car up and lower it again inside a hatchway, but the question asked then (and often now) "What would happen if the rope should break?" had to be answered in a satisfactory manner or the public certainly would not avail itself of this means of travel. Guides of wood were used on this primitive lift for holding the lift car in line in the well; a safety was, therefore, devised that operated upon the breaking of the rope; it dug into the wood of the guides and stopped the car.



Escalator in service in the Mitsukoshi Department Store in Tokyo, a type similar to the escalators in service in the New Sun Department Store in Shanghai

This was known as a "broken rope safety" and is still in use to-day with certain modifications to fit it to steel guide rails. The dogs which formerly dug into the guides were made to fit the round pipe guides which were used to replace the wood, but the action is practically the same as originally developed. This safety has no overspeed action and is not satisfactory as it produces no results except in case of broken ropes, whereas a car may drop from other cause. In fact, broken ropes practically never occur, thus putting this safety out of date. Many of these safeties are still in use, however, —a large percentage of the older machines in the Far East being so equipped. Higher speeds and the necessity of stopping the car gradually instead of with a jar forced the development of a new type of safety. This safety had to be so designed as to make application gradually yet positively and not cause any danger to passengers. These requirements resulted in the production of the screw type of safety device.

This safety is actuated by the usual fly-ball governor placed above the hatchway, which mechanism is connected to the lift car by a flexible steel cable in such a manner that a comparatively easy pull on the cable releases it from its attachment to the car. A second cable is fastened to this governor cable and passes about and is wound upon a drum underneath the car.

When the governor trips or sets, the governor cable is held stationary, thus unwinding the drum cable and causing the drum to revolve; this drum being threaded left and right, unscrews or extends a threaded arm from each end; this arm being connected to a pair of heavy steel jaws causes these jaws to grip the guide rail in the manner of a pair of tongs, thus bringing the car to a gradual and positive stop.

Other Safety Factors

For extremely high speeds this device has been superseded by a type using a wedging and spring action which produces deceleration in exact proportion to the weight and speed acting upon it. Deceleration from high speeds is a most important factor. It has been found by actual test that the human frame can bear without discomfort a certain rate of deceleration and acceleration; beyond this point discomfort becomes acute and often dangerous. A safety device such as the last mentioned then must decelerate the lift car at a rate well below the discomfort point or it will practically defeat its own end. Now suppose that the lift car starts to overspeed close to the limit of travel, leaving insufficient space for the safety to actuate before the lift reaches the bottom of the lift-well—some safeguard must be provided to absorb the shock at a safe rate of deceleration as well as avoid counterweight jump. This retardation is accomplished for relatively slow speed cars by means of spring buffers carefully calculated to the duty of the lift. For high speeds, oil buffers are employed. These buffers are designed to give gradual decleration by the action of oil passing from one chamber to another through varying size ports and serve to bring the overspeeding car to a proper stop without injury to occupants.

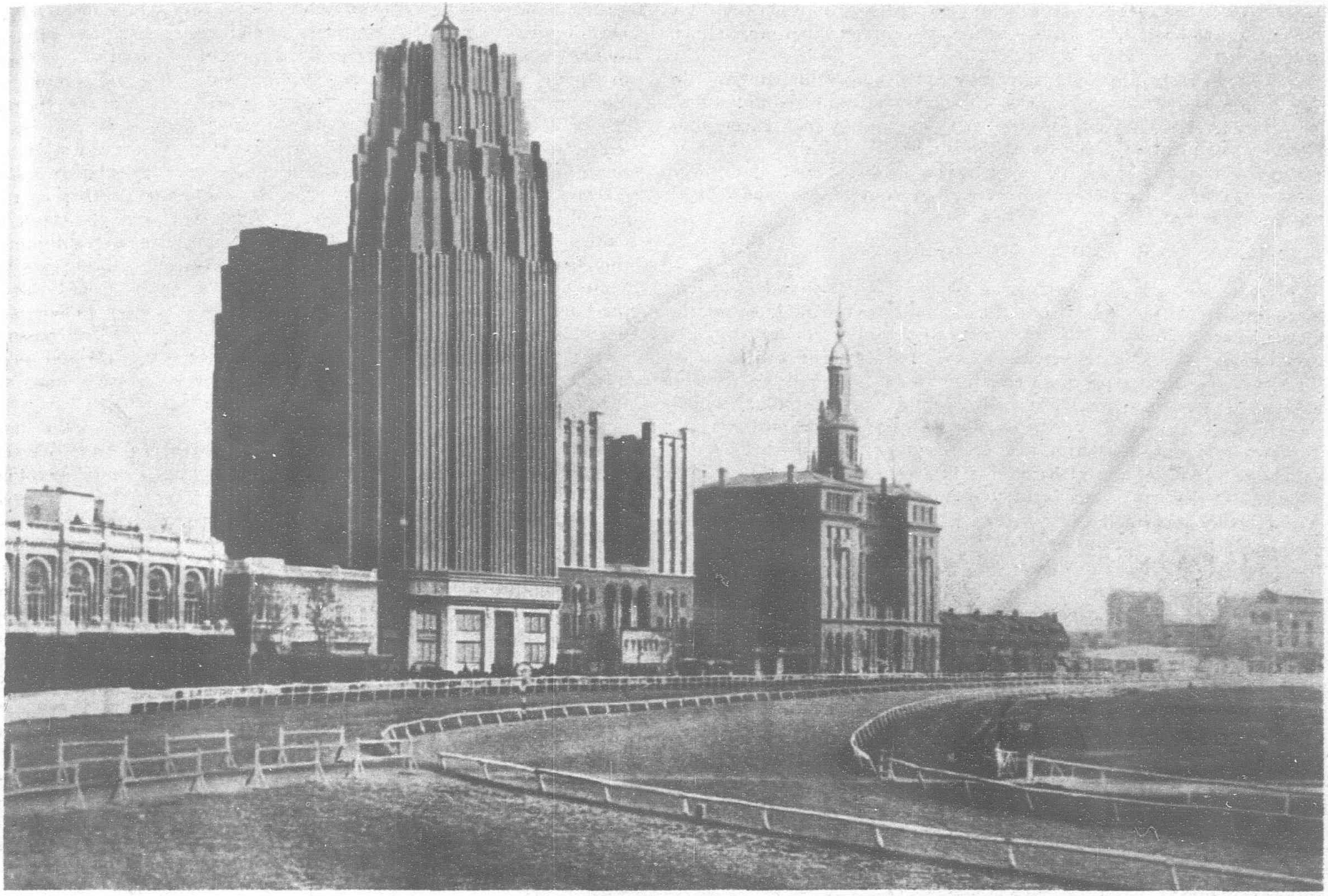
Counterweight jump or lash is a factor not often taken into account by many engineers but has considerable effect on the strength of lift design. Suppose a lift car, the normal operating speed of which is a thousand feet per minute, is suddenly arrested in the downward direction.—The balance weight travelling up at the same speed is not arrested but continues on until the inertia of the weight is exhausted, often a matter of several inches. Drop of the weight then produces a terrific shock unless this lash is properly guarded against. This condition is usually taken care of by means of compensation, which term is used to designate a set of chains or cables fastened to the bottom of the car frame and in turn to the bottom of the balance weight. In the case of cable compensation, cables are kept taut by means of a proper weight in the pit; this weight may be arranged to resist counterweight jump and these cables also serve the important purpose of balancing the hoist ropes proper, a most important factor in high rise lifts.

Refinements in Equipment

The actual pull on hoisting ropes whereby motion is transmitted to the lift car has been accomplished in two ways—connecting cables to and winding about a drum was the usual method for many years and is still used in some cases. It is now inadequate for high rise lifts as the drum became too large due to the long cable necessary, and too heavy for the same reason. This system is also deficient in safety because in case of overwind of the machine the cable was usually broken, which resulted in the lift car or weight being dropped and compelled to depend on the safety device.

The roping of this arrangement was somewhat complicated—the usual plan being two ropes from car over idlers direct to the weight which was divided into two parts. Two more cables then were run from the drum to other part of the weight and two from the drum to the car.

Traction drive now supercedes the drum in nearly all cases. This drive is accomplished by direct connecting the car and balance weight by the necessary number of cables which pass over a grooved sheave. When this sheave is revolved the cables being held by the pinch of the groove travel with the sheave. This drive is not affected by building height, is not subject to overwind, for when car or weight are obstructed, traction is lost and the sheaves simply turn inside the cables. The grooved sheave is of necessity harder on cable than the winding drum, due to the pinch of the groove, but this is taken care of by using a large number of cables which distributes the wear. At the present time for heavy duties,



The Park Hotel building at Shanghai where the fastest and highest climbing elevators in the Far East, installed by Otis, are in service

extremely high rise and speed, a modification of this drive is generally employed.

Instead of grooving the driving sheave with a succession of Vs, the grooves are semi-circular in shape, thus having no pinch or side friction on the cables. Traction is secured by a complete wrap of the hoisting cables about this sheave and a secondary idler sheave. The weight of the car on one end of the cable and the balance weight on the other produces a sufficient grip to provide all the traction needed.—This is the most economical drive for modern conditions so far developed, is thoroughly safe and the wear on cable is not great.

The Problem of Control

The matter of control has come in for more study and experiment than any other part of the lift installation ; it has developed from the throttle and brake operated by a steam engineer to the modern automatic type which can be operated by anyone. When electric lifts were first employed, direct current was the power medium and a standard variable speed control was a more or less simple matter. Direct current falling into disrepute for power systems with the growth of cities, the necessity of using alternating current for lifts forced the development of alternating current motors and control for them. Many systems are used, but the inherent limitations of alternating current prevent the development of a control approaching the flexibility and smoothness of direct current. Due to the limitations of alternating current before mentioned, it is common practice to supply motor generator sets for the operation of the better types of lifts at this time, the improved service and flexibility of control well justifying the extra cost. For slow speeds, for cargo, alternating current is the common practice.

Automatic control is a *sine qua non* of high lift speeds. It has been found that human reactions are too slow to permit the manual control of lifts travelling faster than 700 feet per minute. This would then limit speed unless control be made independent of the driver. Acceleration and decleration also being limited to a rate determined by the frailties of the human body must be controlled to take place at a predetermined curve, which would be physically impossible for a driver to determine.

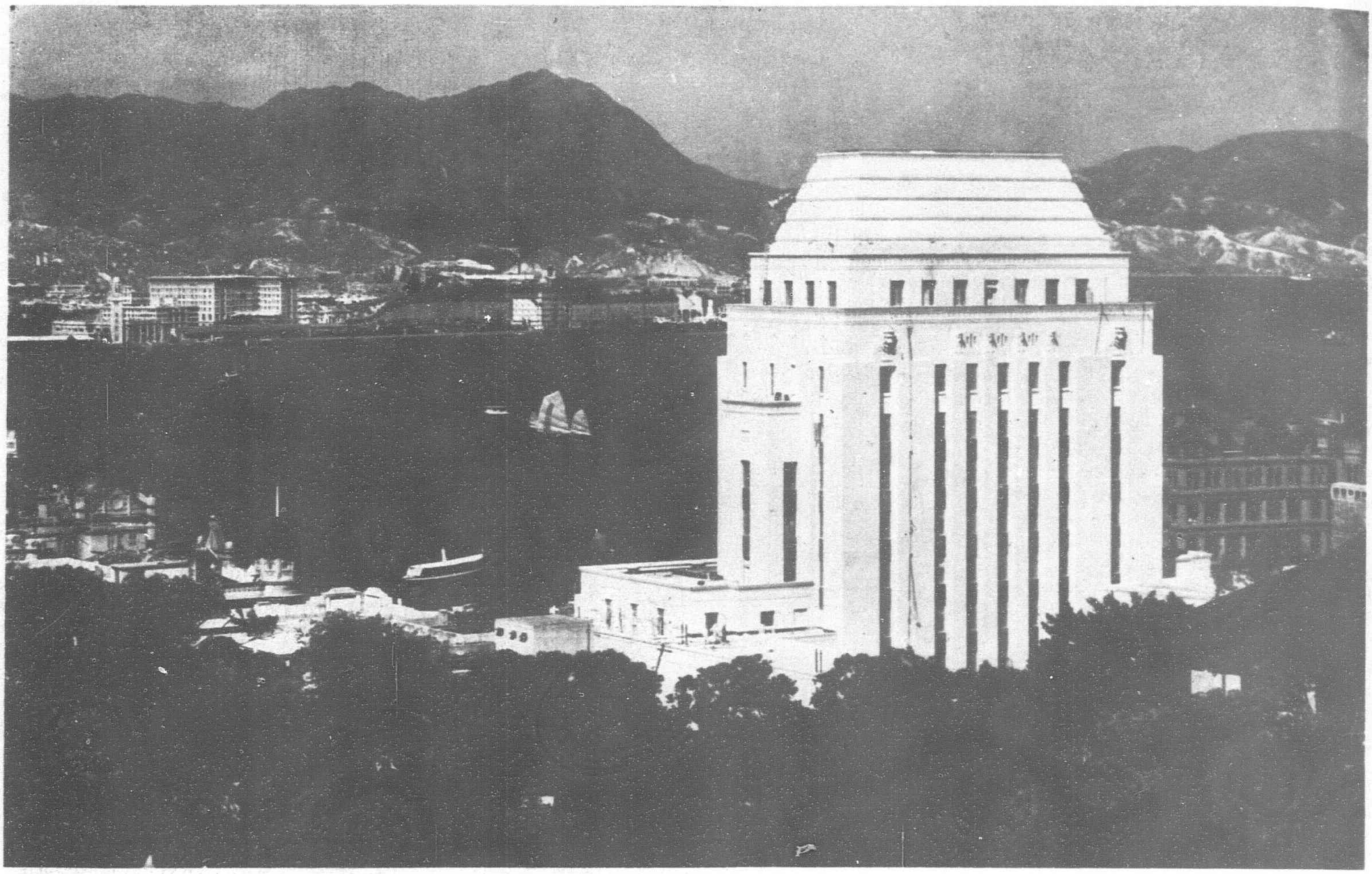
Most types of modern automatic control depend upon the action of push buttons—passengers causing the lift to stop at the floor where the button is pressed, and the driver causing the car to stop at the floor desired by means of buttoms in the car. A modification of this control is used where no driver is employed—the operation of the lift depending wholly upon the pressing of various buttons by the passenger.

The action of the automatic controls is usually dependent upon the action of what is called a selector located in the machine room above the lift. This device is driven by a positive drive from the car and is in effect a small scale model of the hatchway proper ; a sliding crosshead moves in exact relation to the movement of the car. This crosshead carries the various contacts and switches necessary to the controlling of relays which are set by the floor buttons and hence controls the starting and stopping of the lift.

Acceleration and deceleration are controlled either by the action of slowdown switches in the hatchway or by contacts carried by the selector crosshead. Where several lifts are installed *en banc*, it is the custom to employ a Starter to avoid duplication of effort and confusion in the service. This man holds the cars in the lobby until properly loaded, thus automatically holding the other cars at the top, avoiding unnecessary trips. Where very many cars are installed, a Dispatcher is used instead. This man has an office adjacent to the lifts and watches the progress of all the cars by means of indicators, thus being able to start and stop them to best advantage. A simple scheduling device may be employed where but two or three cars are *en banc*. To avoid duplication of calls, this device starts and holds the cars by means of light signals automatically flashed at predetermined intervals.

Details of Control

High speed lifts generally operate by means of slow speed motors direct connected to the driving member. These motors are



The great monumental structure of the Hongkong and Shanghai Banking Corporation recently erected at Hongkong, which has the most modern Otis elevator equipment in service

of necessity direct current, for as yet alternating current has not permitted slow variable speed motors suitable for lift service. These large direct current motors must be extremely rugged in construction and subject to considerable variation in speed. The direct current is generally supplied through a motor generator set, the generator and motor of which are connected directly to the motor armature leads. This direct connection avoids the use of heavy resistances as well as heavy switching gear as the speed of the lift motor is now controlled by varying the generator field. This method of speed control presents a number of interesting features in design. The necessity of building up, decreasing and entirely reversing the polarity of the generator field requires very careful design and construction. Unless the field be completely demagnetized for a stop, eddy or sneak currents must develop—especially where a series wound motor is employed with a constant running motor generator set. A small current must, therefore, be sent through the generator field at each stop, this current being in the opposite direction to magnetizing current just employed. This same direct current system is often used with smaller geared machines with excellent results, producing great flexibility of control and smooth operation.

Direct current motors are particularly adapted to self-levelling, now considered a prime necessity. A levelling field is supplied in addition to the other field windings of the generator and this field used only to produce the slow speed necessary to proper levelling action of the lift motor. This field is controlled by means of cams in the hatchway, the selector, or other means which remove its control entirely from the driver and make it entirely automatic.

Alternating current control presents an entirely different set of problems. Slip or Collector Ring Motors were generally used when alternating current was first employed for lift service. The faults inherent in this type of motor were much magnified in lift service and were a great drawback to its use. To such an extent was this true that it is now common practice to use a squirrel cage motor especially designed for lift service. This motor is usually of comparatively low speed and has the rotor supplied with a high internal resistance which effectively limits the starting current. The line current is also limited by series resistance, which is cut out automatically when starting. These motors are commonly wound to take a two to one starting current.

Regarding Lift Motors

The characteristics of a lift motor are very different from the regular commercial motor. It must be remembered that the lift motor is more of a stopping and starting device than a true motor (at times, indeed, it is a brake)—its function being to hold back rather than pull the load. It is easily seen, therefore, that power factor may become a serious question where a large number of alternating current lift motors are connected to the power lines of a city. The terrific use and abuse these motors must stand means that they must be exceedingly rugged, must resist high pent house temperatures and operate 24 hours a day with literally thousands of stops and starts and often with little or no attention, and, if a slip ring motor, very often with improperly adjusted secondary circuit.

Two speed motors are often used for the higher speed alternating current machines. These may be either double winding (that is two windings having different number of poles) or in some cases there are two distinct motors in the same housing, having the shaft in common. Slow speed then can be produced by cascading the windings of the two motors. The chief objection to this double motor system is the fact that the two motors produce too great rotor weight, thus increasing the inertia of the revolving parts, this being a distinct disadvantage to starting and stopping, particularly in stopping, for which alternating current machines depend almost entirely on the brake. As a satisfactory main motor levelling device for alternating current has not as yet been developed, it is customary to produce automatic levelling by means of an additional small motor and gearing automatically brought into operation when the lift car is stopping at the floor.

About Cargo Lifts

Improvements made on passenger lifts are reflected in the modern cargo lift to such an extent that size and capacity now

(Continued on page 278)

The Present Status of Broadcasting Installations in Japan

By YOSOSHICHI YONEZAWA, Director of Engineering, The Broadcasting Corporation of Japan

I.—The Distribution of Broadcasting Stations in Japan

The broadcasting enterprise of Japan, started fully ten years ago, has about 2,300,000 subscribers with a present monthly rate of increase of about 40,000. There are a total of twenty-five broadcasting stations, dual broadcasting being established at Tokyo, Osaka and Nagoya. In addition, those at Kagoshima and Toyama, now under construction, will be completed shortly; and during the coming year it is expected that further erections will take place at Obihiro, Yamagata, Kofu, Tottori and Miyazaki.

Essentially, Japan spans from 22 degrees to 50 degrees north latitude and has a long and narrow configuration consisting of the various islands of Taiwan (Formosa), Kyushu, Shikoku, Honshu (Japan Proper), Hokkaido and Karafuto (Saghalien). The centers of all these islands are overlaid with mountain ranges, so that conditions for the propagation of radio waves are very unfavorable because of the large amount of mountainous territory.

Therefore, in order to expand the service area most effectively, it is much more advantageous to distribute a large number of low-power broadcasting stations over all regions than to erect a few high-power stations. Complying with this situation a principle of low-power-and-many-stations was adopted. In consequence, among the stations established at present in each region, those having ten kilowatts of antenna power are at the seven large metropolises of Sapporo, Sendai, Tokyo, Nagoya, Osaka, Hiroshima and Kumamoto, with dual broadcasting installations at Tokyo, Nagoya and Osaka as mentioned before. There is a three kilowatt broadcasting station at Kanazawa, a one kilowatt station at Kokura, a 500 watt station at each of Hakodate, Niigata, Nagano, Mayebashi, Shizuoka, Hamamatsu, Okayama, Tokushima, Kochi, Matsue, Fukuoka and Nagasaki, and 300 watt transmitters at Asahigawa, Akita, Fukui and Kyoto. Using as a basis the three tube receivers (consisting of regenerative detection and one or two stages of audio-frequency amplification) that are most widely used at present in Japan, if the threshold of field strength that can be of practical service is assumed to be 0.5 microvolt per meter, a simple field strength contour map of the entire country would be as shown in Figure 1. It may also be seen from this figure how advantageous it is under such geographical conditions as exist in Japan to properly distribute low-power stations in the metropolitan centers of each region.

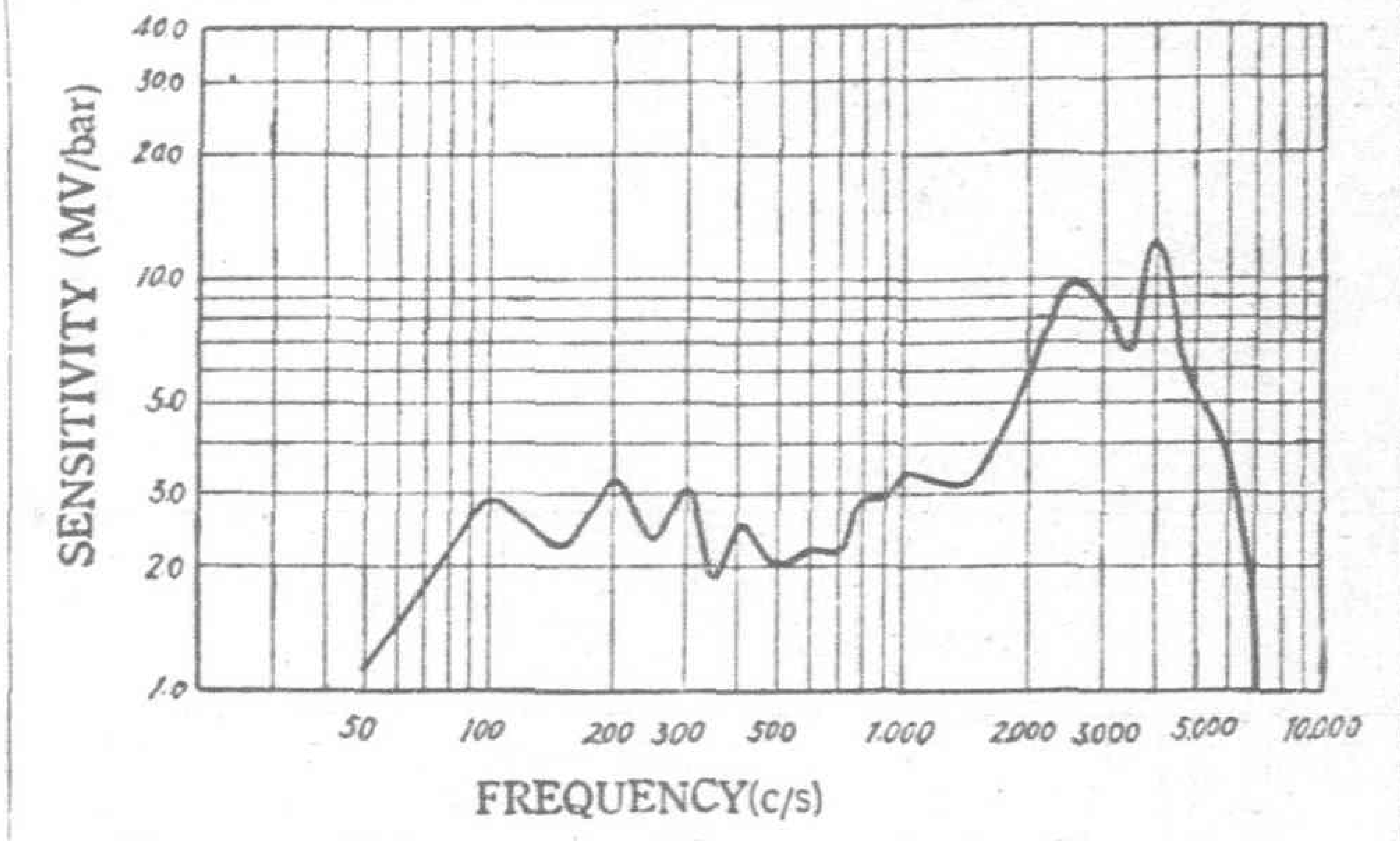


Fig. 2. Frequency Characteristic Curve of the M.H Carbon Microphone

Domestically the plans based upon the low-power-many-stations principle are being progressively realized, but on the other hand there exists a competitive situation among many Western countries at present to erect high-power stations and to use them for advantageous international communications. With the appearance of high-power stations in the countries of the Far East, Japan, situated as she is just off the main Asiatic continent, has been faced with the necessity of not only competing with other broadcasts but also holding her recognition among the nations. In addition, the demand for guarding listeners against local interference may be cited as another of the reasons for erecting a high-power station. The intensity of noise detrimental to broadcasting reception has greatly increased with the rapid development of various industries concomitant with the everyday progress of Tokyo and other large cities. A number of plans are being devised to cope with this problem; but rather than attempting any negative steps, the more desirable and positive plan is to make reception easier by increasing the field strength of broadcast waves far beyond the noise level. From such a viewpoint it was decided that dual broadcasting systems with 150 kilowatts of antenna

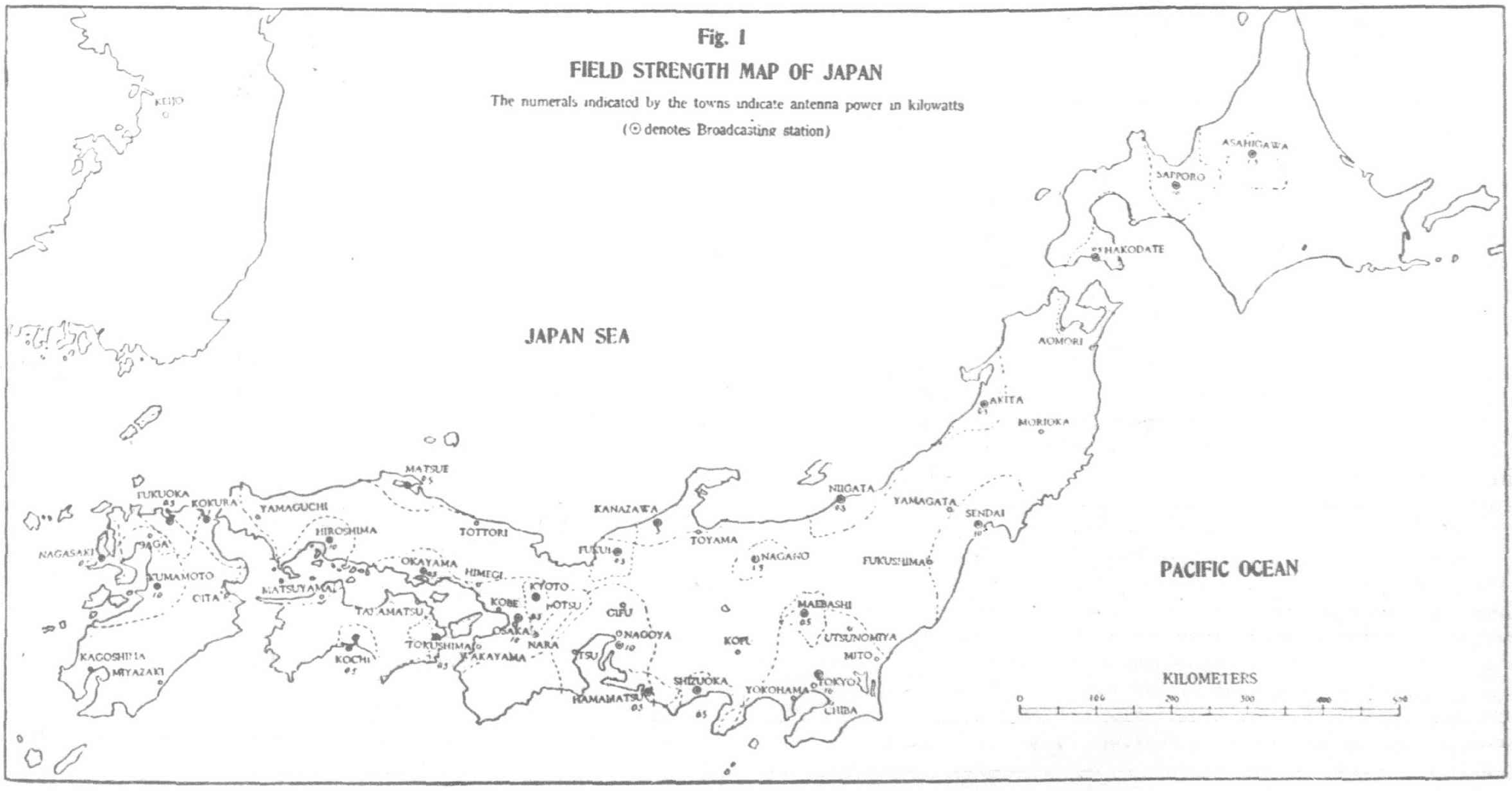
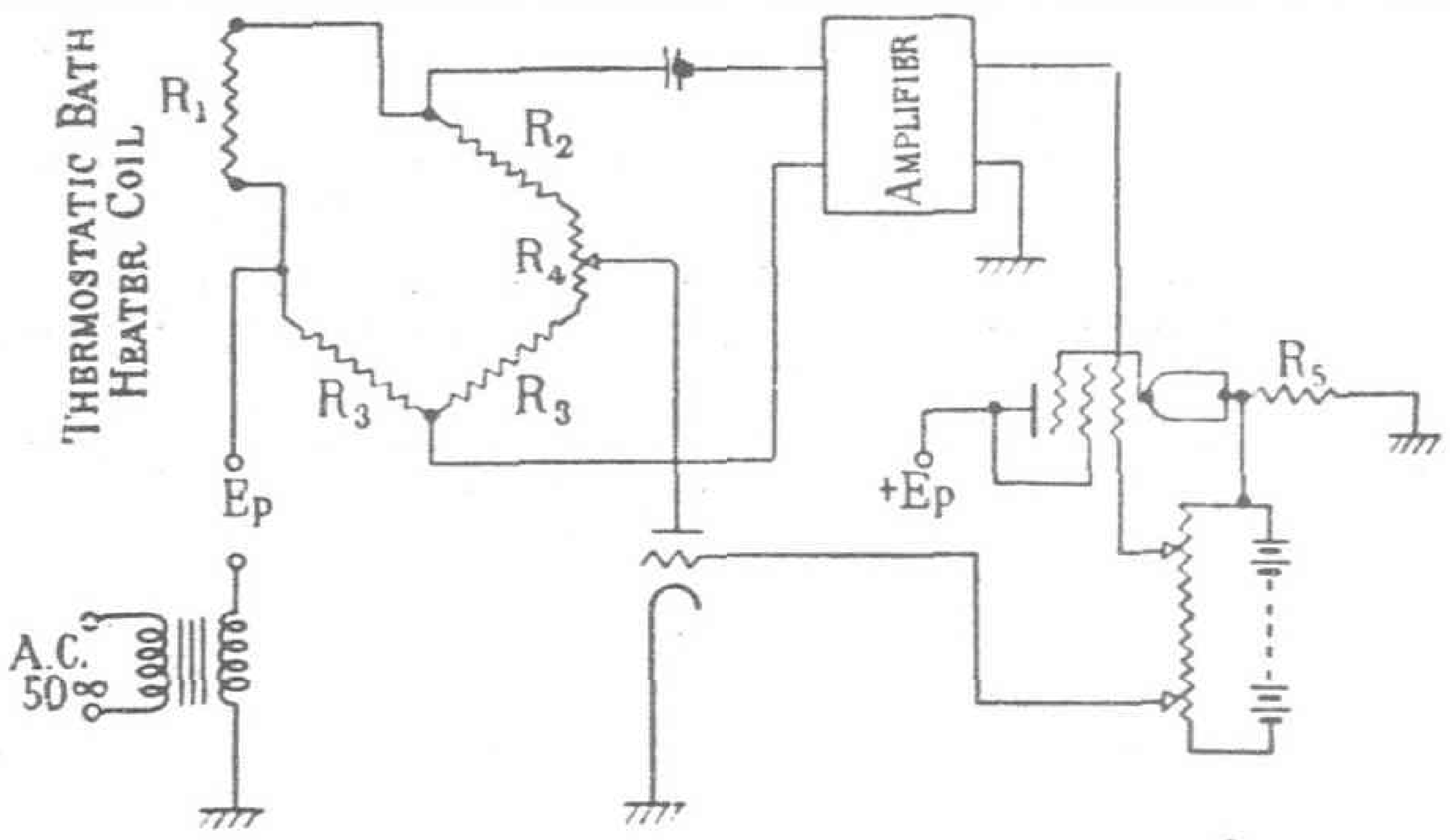


Fig. 1
FIELD STRENGTH MAP OF JAPAN
The numerals indicated by the towns indicate antenna power in kilowatts
(⊙ denotes Broadcasting station)

power be installed in the outskirts of Japan's capital, Tokyo ; the construction work has already begun. When this is completed the field strength will be over two millivolts per meter on the average (at daytime) over the entire area circled by Mito, Utsunomiya, Takasaki and Odawara, with Tokyo at the center ; and it is certain that the field strength within Tokyo will be more than 200 millivolts per meter, which is a value sufficiently large in comparison with the noise intensity. It is expected that the frequencies to be used will be the same as those now employed ; that is, Broadcast Station No. 1 will work on 590 kilocycles and No. 2 on 870 kilocycles. With these frequencies, the daytime field intensities computed for 150 kilowatts of antenna power are as follows, using the value 5.3 × 10^{-14} e.m.u. for the earth conductivity obtained from measurements in Mito and Takasaki districts :



R_1 Nickel wire (Temp Coeff. $40 \times 10^{-3} \Omega/^\circ C$)
R_2, R_3, R_4 Constantan wire

Fig. 3.

Place	Field Intensity Station No. 1	Station No. 2
Mito	2.88	8.74
Utsunomiya	6.65	15.9
Takasaki	3.16	9.35
Odawara	3.04	9.0
Atami	2.58	7.8
Choshi	2.34	7.25
Narita	7.5	19.9
Hojo	8.45	17.2
Yokohama	23.7	42.3

II.—Main Equipment at the Broadcasting Stations

The ten kilowatt transmitters of Tokyo, Nagoya, Osaka and others are all foreign made (there have been some later partial improvements). At the time when these stations were built, the art of radio broadcasting was in its infancy in Japan, and there having been no firm capable of building broadcast transmitters at that time, the use of foreign made articles was necessary. Since then, the progress of radio technique in Japan has been remarkably rapid. The first domestic broadcasting transmitter of 500 watts, installed at Fukuoka in 1930, gave a better record of performance than anticipated, and with this

TABLE I

Station Name	Call Letters	Antenna Power (kw.)	Frequency (kc/sec)	Manufacturer and Transmitter	Date When Broadcasts Were Started
Tokyo Central Broadcasting Station	J O A K	No.1 . . 10.0	870	Marconi Co. QD 13 (rebuilt)	May, 1928
		No.2 . . 10.0	590	Assembled by B.C.J.	Apr., 1931
Osaka Central Broadcasting Station	J O B K	No.1 . . 10.0	750	Marconi Co. QD 13	May, 1928
		No.2 . . 10.0	1085	Marconi Co. PA 18A	June, 1933
Nagoya Central Broadcasting Station	J O C K	No.1 . . 10.0	810	Marconi Co. PA 5A	Dec., 1929
		No.2 . . 10.0	1175	Tokyo Elec. Co. GRP-101A	June, 1933
Hiroshima Central Broadcasting Station	J O F K	10.0	850	S. T. C.	July, 1928
Kumamoto Central Broadcasting Station	J O G K	10.0	790	Marconi Co. QD 13	June, 1928
Sendai Central Broadcasting Station	J O H K	10.0	770	S. T. C.	June, 1928
Sapporo Central Broadcasting Station	J O I K	10.0	830	S. T. C.	June, 1928
Kanazawa Broadcasting Station	J O J K	3.0	710	Nihon Musen (Telefunken system)	Apr., 1930
Okayama Broadcasting Station	J O K K	0.5	700	Nippon Elec. Co.	Feb., 1931
Fukuoka Broadcasting Station	J O L K	0.5	680	Anritu Elec. Co.	Dec., 1930
Nagano Broadcasting Station	J O N K	0.5	940	Assembled by B. C. J.	Nov., 1931
Kyoto Broadcasting Station	J O O K	0.3	960	Nippon Elec. Co.	June, 1932
Shizuoka Broadcasting Station	J O P K	0.5	780	Western Elec. Co. (rebuilt)	Mar., 1931
Niigata Broadcasting Station	J O Q K	0.5	920	Assembled by B. C. J.	Nov., 1931
Kochi Broadcasting Station	J O R K	0.5	720	Nihon Musen Co.	Mar., 1932
Kokura Broadcasting Station	J O S K	1.0	735	Tokyo Elec. Co.	Dec., 1931
Matsue Broadcasting Station	J O T K	0.5	625	Nippon Elec. Co.	Mar., 1932
Akita Broadcasting Station	J O U K	0.3	645	Tokyo Musen Co.	Feb., 1932
Hakodate Broadcasting Station	J O V K	0.5	680	Anritu Elec. Co.	Feb., 1932
Tokushima Broadcasting Station	J O X K	0.5	980	Anritu Elec. Co	July, 1933
Nagasaki Broadcasting Station	J O A G	0.5	930	Nippon Elec. Co.	Sept., 1933
Mayebashi Broadcasting Station	J O B G	0.5	970	Tokyo Musen Co.	June, 1933
Asahigawa Broadcasting Station	J O C G	0.3	655	Tokyo Elec. Co. GRP 35B	Sept., 1933
Hamamatsu Broadcating Station	J O D G	0.5	635	Nihon Musen Co.	July, 1933
Fukui Broadcasting Station	J O F G	0.3	990	Nippon Elec. Co.	July, 1933

as the beginning, domestic products have been used in all subsequently new installations. To-day all broadcasting apparatus can be completely self-supplied by domestic articles; and regarding their function, some very excellent equipment is being manufactured. In Table I are shown the manufacturing firms for the transmitter of each broadcasting station, the frequency employed, antenna power, and the date when broadcasts were first started. All of the forementioned 150 kilowatt broadcasting equipment are to be built of Japan-made products which are now being manufactured.

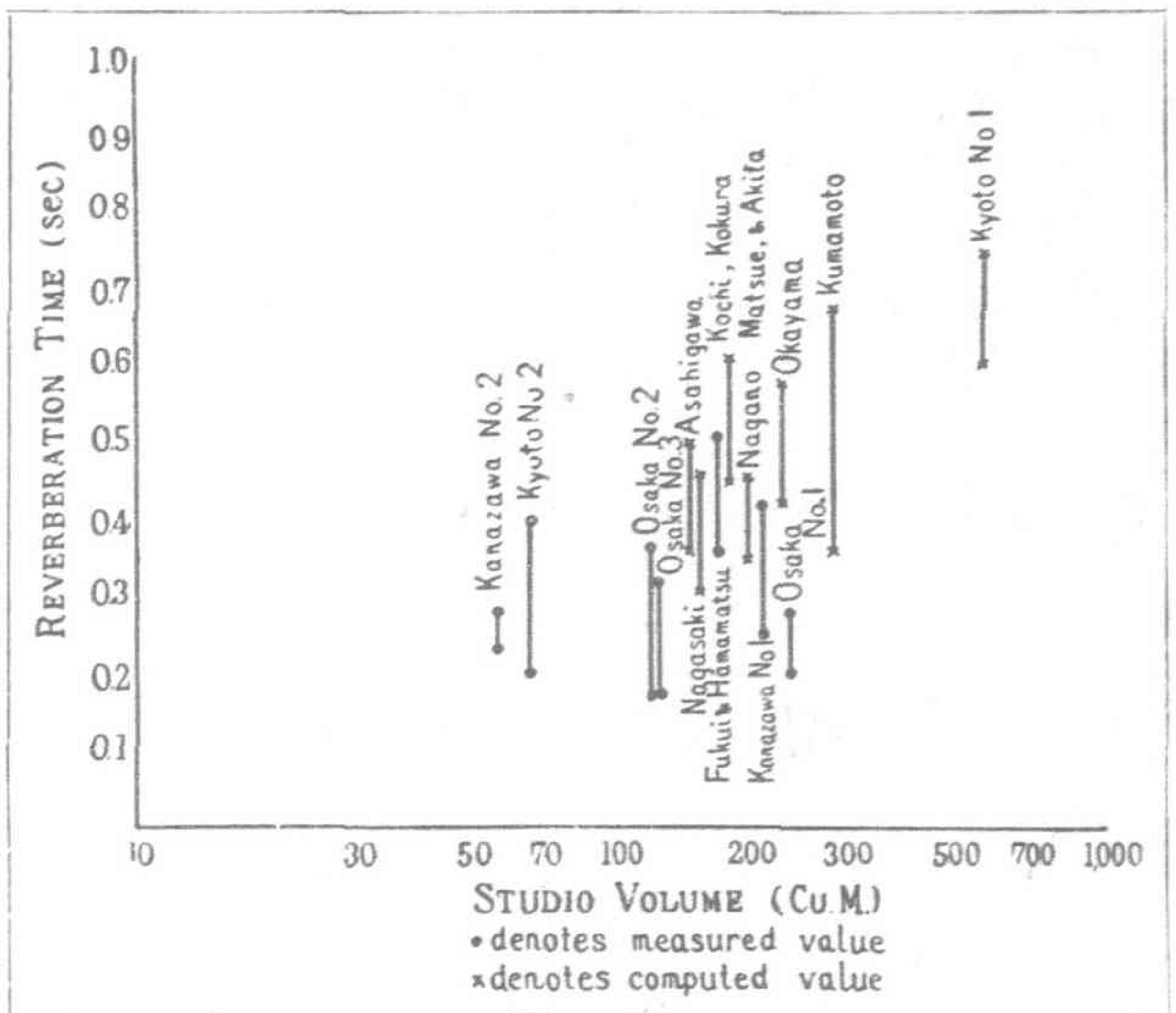


Fig. 4.

A.—Microphones

The microphones now being used are the MH type made at the Research Laboratory of the Broadcasting Corporation of Japan. This is a type of Reitz microphone using minute carbon granules less than 100 microns in size, and because different sized carbon granules have been mixed in various proportions, the frequency characteristic is comparatively good for a carbon microphone, as shown in Figure 2. But a drawback exists in that the response to high frequency acoustic waves falls off severely. Besides this, the accompaniment of the so-called carbon noise peculiar to carbon microphones is also another disadvantage. On the other hand, however, it is little affected by such outside influences as humidity or atmospheric temperature and pressure, and especially where humidity is as high as in Japan, the moisture resisting and accompanying mechanically rigid properties of its construction,—which make for remarkable ease in handling during outdoor broadcasts or mobile broadcasts—may be counted as one great advantage in meeting with actual broadcasting conditions. With regard to the sound quality the necessity exists for reproducing completely a frequency band of 30 to 16,000-cycles, and to-day, when speech amplifiers possessing frequency characteristics which entirely satisfy that requirement are being built, the immediate need is for still greater improvements on the microphones. To this end the Broadcasting Corporation is conducting investigations and studies at the Research Laboratory upon ribbon microphones, which possess very good characteristics, and tests are being performed upon further improved, trially made articles.

B.—Speech Amplifiers

The speech amplifiers are divided into three parts, the *A*, *B*, and *C* amplifiers. The *A* amplifier is connected to the microphone and amplifies the microphone output; its gain, therefore, must be large, one producing 50 db and more being used. The *B* amplifier is a power amplifier which further increases the output from *A* and feeds it into the speech amplifier of the transmitter; its gain is more than 30 db. The *C* amplifier is utilized for relaying to other stations and requires a gain of 20 db or more to compensate for losses occurring in the relaying lines. These amplifiers are all resistance coupled, two or three stages of amplification being widely used. Of late, the main criterion in their manufacture requires that the variation of the frequency characteristics must be less than ±2.5 db, over the range from 30 to 16,000-cycles, referring to the gain at 1,000-cycles, and that the combined characteristic measured through both *A* and *B* amplifiers must not be permitted to vary more than ±4 db, with respect to 1,000-cycles, over the range between 30 and 16,000-cycles. These amplifiers all play main rôles in the broadcasting system; but other than these, there are the monitoring amplifiers at the studios for checking broadcasting conditions, test amplifiers used in program auditions, etc., which indirectly influence the resultant broadcasts, so that equipment as excellent as the *A*, *B*, and *C* amplifiers regarding every detail of performance and characteristic are employed. The various voltage sources required by the *A*, *B*, and *C* amplifiers are obtained from storage batteries in general for the sake of tone clarity and furthermore in order to avoid disturbing a broadcast when there is a temporary interruption of line power. For the test and monitoring amplifiers, the sources are in some cases obtained from eliminators. Two sets each of these storage batteries are installed and are employed alternately. Recently, mercury vapor rectifier tubes were put in use for charging purposes.

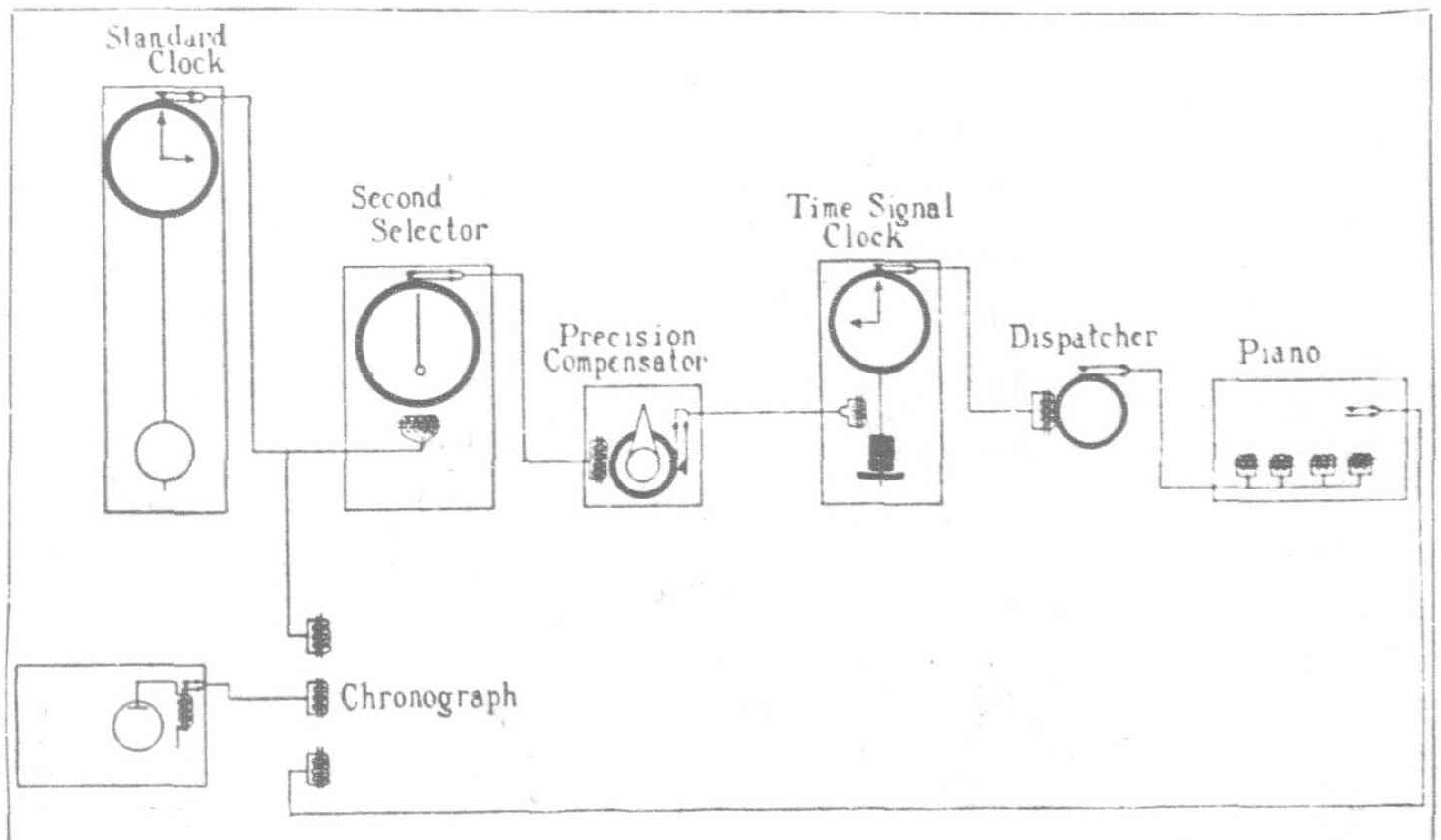


Fig. 5

C.—Broadcasting Transmitters

To stabilize the oscillation frequency, crystal controlled master oscillators are used everywhere except in the transmitters of Station 1 at Osaka and the station at Kumamoto where self-excited master oscillators are employed. Thus at the start of broadcasting when self-excited master oscillators were used, the frequency variation was barely held within 25 parts in 10,000; but through the crystal oscillators coming into use with further improvements, the present high precision is within three parts in 100,000. Concerning the oscillating crystals, the *X*-cut was largely seen in use at first, but the *YT*-cut crystals of smaller temperature co-efficient came into service; and recently the *R'*-cut plate, with its very highly stable frequency and strong oscillations, notwithstanding the comparatively small size, is gradually coming into use. Moreover a number of improvements have been produced regarding the thermostatic control device holding the crystal. A very sharp and finely adjustable method discarding the present mechanical methods of temperature control and resorting to an entirely electrical adjustment has been devised (Fig. 3). Also various researches are being conducted on frequency monitoring equipment for the purpose of precisely observing the fluctuations in oscillation frequency. A 500 cycle beat frequency, obtained between the oscillation currents of the broadcast transmitter and a local crystal controlled oscillator, is used in producing an alternating current, and the variations in this beat frequency are observed by a frequency meter; such an apparatus is capable of indicating readily very slight frequency fluctuations.

The modulation process takes place in the low-power stage except at the Kumamoto and Osaka Number 1 stations where high-power modulation is employed for the type *QD* 13 broadcast transmitters secured from the Marconi Company at the beginning of ten kilowatt broadcasting. The cause lies in the fact that high-power modulation produces a large number of harmonics in comparison with low-power modulation, has also a poor frequency characteristic, and furthermore cannot be used for high degree modulation. Plate modulation is used to a large extent, grid modulation being employed only at Kanazawa, Hamamatsu and Kochi, where the products of Telefunken and Nihon Musen, using the Telefunken system, are installed. With either method 100 per cent undistorted modulation can be attained, and the recent frequency characteristics at 80 per cent modulation do not possess variations of over ±3 db, referred to the condition at 1,000-cycles, in the range between 30 to 16,000-cycles.

A number of methods have been devised for preventing the generation of harmonics. A most widely used method is the insertion of a low-pass filter between the transmitter and antenna; there is also a method of connecting the power amplifiers in push-pull. Other than these, a resistance connected in parallel or series with the choke coil to prevent the generation of parasitic oscillations, or the use of condenser coupling is resorted to for the purpose of suppressing the emission of harmonics. Among the recent and most numerously built 500 watt stations, the limit imposed upon the harmonic content is 0.05 per cent of the fundamental wave field strength measured at five kilometers from the antenna.

D.—Antennas

T type antennas are most widely used, followed by the inverted *L* and vertical types. The only different one is at Hiroshima, where a multiple-tuned antenna system is employed. The size of each part and the grounding method may be found by referring to Table II. The antennas to be employed at the new 150 kilowatt stations will be of the vertical type for anti-fading purposes; erecting two pairs of steel towers, 310 meters and 200 meters high with spans of 430 meters and 310 meters respectively, vertical antennas approximately 0.53 λ in length will be used. Concentric cylinder type of feeders are to be used, and the grounding method will be the burying of conductors within a radius of about 0.335 times the wave length and furthermore fastening copper tubes to the ends to make up for the shortness of the wires.

E.—Power Supply Equipment

The power sources for the transmitters consist of (1) those obtained from the D.C. generators of motor-generator sets (2) those from tube rectifier sets, and (3) those employing method (1) and the D.C. source from tube rectifiers fed by alternators. Method (1) is used a great deal among low-power stations, and method (3) chiefly among the 10 kilowatt stations. The reason that vacuum tube rectifiers are employed in the 10 kilowatt stations is that a high potential of from 10,000 to 15,000-volts is used as the plate voltage on the last stage of the power amplifier, and such a voltage is very difficult to secure from a D.C. generator. In striving to prevent voltage fluctuations of the A.C. source, an intervening motor-generator set or induction regulator was resorted to; but

Table II

Call Letters	*Oscillation System*	*Modulation Method*	*Antenna*				*Grounding Method*	*Antenna Resist. (Ohms)*
			Tower Height (Meters)	*Type*	*Length of Horizontal Part (Meters)*	*Height Above Ground (Meters)*		
JOAK No. 1	Crystal Control	Low-power Plate Mod.	55	T	30	52	Counterpoise (height 7.5 m)	20.0
No. 2	,,	Low-power Plate Mod.	(Wood) 57&60	T	75	52	Buried Copper Plates	21.0
JOBK No. 1	Self-excitation	High-power Plate Mod.	60	T	19.7	55.6	Buried Conductors	10.0
No. 2	Crystal Control	Low-power Plate Mod.	100	T	23.0	97.3	do.	3400.0
JOCK No. 1	do.	do.	55	Inverted L	17	52.5	do.	28.4
No. 2	do.	do.	100	Vertical	—	96.5	do.	570.0
JOFK	do.	do.	35	Multiple tuned	70	34	do.	61.0
JOGK	Self-excitation	High-power Plate Mod.	60	T	42.5	55.8	Counterpoise (height 7.566 m)	12.3
JOHK	Crystal Control	Low-power Plate Mod.	60	T	42	56	do.	17.3
JOIK	do.	do.	50	T	42.4	51.5	do.	—
JOJK	do.	Low-power Grid Mod.	60	T	60	55	Buried Conductors	22.0
JOKK	do.	Low-power Plate Mod.	50	T	27	46	Counterpoise (height 7 m)	6.7
JOLK	do.	do.	45	Inverted L	36	45	Buried Conductors	11.7
JONK	do.	do.	55	T	40	46.2	Buried Copper Plates	27.0
JOOK	do.	do.	55	Inverted L	18	52	Buried Conductors	26.0
JOPK	do.	do.	50 and 60	T	54	45	Counterpoise (height 5 m)	17.2
JOQK	do.	do.	55	T	33	52	Counterpoise (height 7.5 m)	—
JORK	do.	Low-power Grid Mod.	55	T	50	50.3	Buried Copper Cylinders	27.0
JOSK	do	Low-power Plate Mod.	55	T	54	53	Buried Conductors	22.5
JOTK	do.	do.	55	T	56	52.5	Counterpoise (height 7.3 m)	12.5
JOUK	do.	do.	55	Inverted L	48.3	54	Buried Conductors	20.7
JOVK	do.	do.	55	Inverted L	50	51.5	do.	39.0
JOXK	do.	do.	70	T	26	67	do.	105.0
JOAG	do.	do.	60	T	38	59	do.	38.2
JOBG	do.	do.	52	T	30	50	Buried Copper Plates	28.3
JOCG	do.	do.	70	Inverted L	30	65	Buried Conductors	29.0
JODG	do.	Low-power Grid Mod.	70	T	56	66	do.	23.5
JOFG	do.	Low-power Plate Mod.	70	Vertical	—	66.75	do.	14.0

recently the Electrotechnical Laboratory of the Ministry of Communications developed an automatic voltage regulator utilizing a three-electrode discharge tube, and in using this it is possible for low-power stations to completely discard the use of such rotary machines as motor-generators and obtain all D.C. supplies from mercury vapor rectifiers and, for filament use, copper oxide rectifiers. Thus the noise from rotating machinery may be completely eliminated, and besides raising the over-all efficiency through the use of highly efficient mercury vapor rectifiers, a great advantage is seen from the standpoint of handling and maintenance. This automatic regulator utilizing the three electrode discharge tube is used conjointly with the automatic induction regulator, and since there is no adjusting mechanism other than the governing motor, a very highly precise and automatic adjustment may be obtained in the regulating operation.

In view of the fact that broadcasting stations are of such a nature that their mission must all the more be fulfilled during times of natural disasters or other emergencies when the outside source of electric power may be cut off, all important stations are equipped with generators coupled to gasoline or Diesel engines as individual emergency power plants.

F.—The Studios

Through the development of relaying networks, the present programs are nearly all centralized at Tokyo and Osaka, and the performances are given from these studios. These studios being of the early broadcasting period, there is little to be observed, but a brief record of investigations on the studios of all broadcasting stations will be given for reference. One predominant problem in studio rooms concerns the reverberation period ; Figure 4 shows the values for the conditions of greatest and least reveberation in the studio plotted for the volume of the studio and the reverberation time which were obtained either by actual measurements or by calculation. It is evident from these results that the early studios were built to be very " dead." There exists quite a wide difference among the values for entertainment studios, ranging between 0.3 second, or thereabouts, for studio Number 1 of the Osaka Central Broadcasting Station and 0.75 second for studio one of the Kyoto station, although, of course, such studios as those used for lectures should be built " dead." The reverberation period depends upon the widely different programs, and the question is very difficult to solve at present. In general, rather long periods are necessary for music, but in Japan some consideration must be given to the music peculiar to that country, and in applying the studios to a large variety of programs, it is impossible to let the reverberation time be as long as those of other countries, although at around 0.3 second the deadness is indeed too disagreeable. As a consequence, the practice of late is to increase the sonority while simultaneously increasing the room volume, and some of the older studios have undergone partial remodelling in an endeavor to make them to some extent more " alive." Also in order to apply one studio room to a large number of program varieties, it is necessary to be able to properly adjust the reverberation period ; although curtains have often been used in the past for this purpose, it was found that unless these curtains are of thick material and are suspended far enough away from the walls to avoid the effect of the rear absorbing material, their utility will be low and the adjustable range narrow. Many of the low-power stations distributed in each district possess but one studio ; in such a case the room is used for both talks and entertainments, so that the reverberation period cannot be made too long. Thus, from measured results, for example, the condition for the largest amount of reverberation at the Fukui and Hamamatsu stations is around 0.5 second, and even at the condition for very shortest reverberation it is much too large and disagreeable for talks. In short, the attainment of satisfactory broadcasts through the mutual use of a small number of studios for all types of programs is a very difficult task, and the ideal situation is to be equipped with studios each possessing the proper reverberation time for its purpose. If this is attained, the rehearsals can also be made at the station and broadcasted under exactly the same conditions, so that the over-all effectiveness of the broadcasts can be raised. In view of this the Broadcasting Corporation is planning to erect at Osaka and Tokyo broadcast buildings containing more than ten studio rooms. The Osaka hall is planned to have a total of twelve studios ; in the following list are given the size of each studio and the purpose to which each will be put :

Studio 1	Occidental music	4,500 cu. meters
Studio 2	,, ,, ...	737
Studio 3	,, ,, ...	366
Studio 4	Japanese music	286
Studio 5	,, ,, ...	145
Studio 6	,, ,, ...	151.3
Studio 7	Lectures and radio exercises ..	143.7
Studio 8	News, announcements, and stock reports	63.4
Studio 9	Lectures	117.2
Studio 10	News, announcements, and stock reports	63.4
Studio 11	Japanese music	128.1
Studio 12	Emergency	73.4

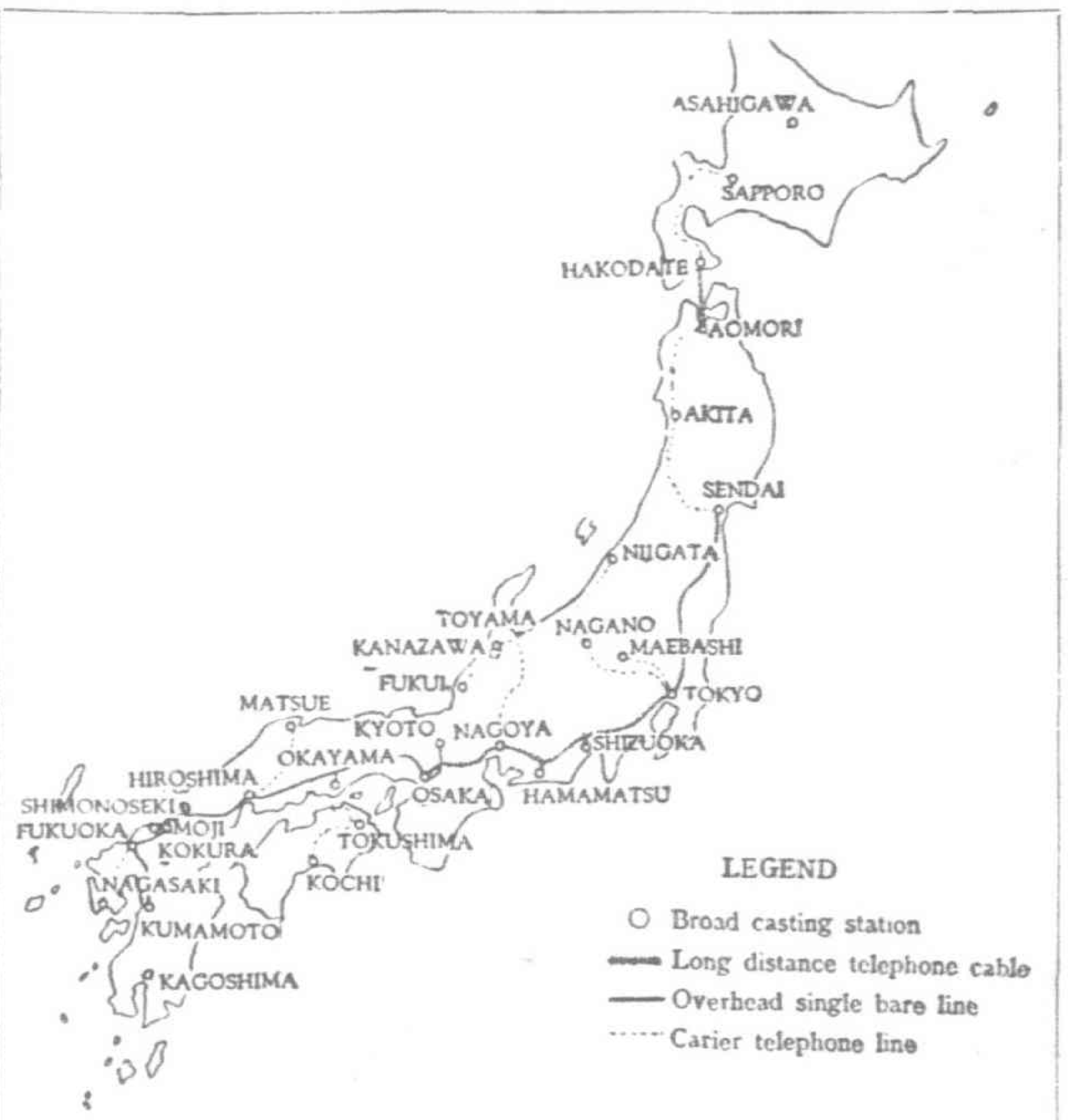


Fig. 6. Relay Network of the Entire Country

G.—Time Signal Equipment

The time signal apparatus discussed below is installed at the Atagoyama studio of the Tokyo Central Broadcasting Station. The precise Japan Central Standard Time, the average solar time at longitude 135° E, is announced over the entire country. A schematic operating diagram of this time signal apparatus is shown in Figure 5. The standard clock is encased in a thermostatic device at 30 degrees centigrade to reduce the error to the very least. Moreover, the error is determined by the standard time given each day from the astronomical observatory, and compensating for the errors by use of the precision compensator and second selector, the accurately set time signal clock is operated, the impulse therefrom exciting the electromagnet which automatically operates the time signal piano. The time signal given in this manner has an error of within 0.02 second arising from the apparatus itself, and when the error in the time signal coming from the observatory is also taken into consideration, the total error with respect to Japan Central Standard Time is less than 0.1 second.

III.—Broadcast Relaying Equipment

After broadcasting stations were erected in each region, wire relay broadcasting was established among all stations in November, 1928 ; at first the Sapporo station utilized a wireless relay system because of financial considerations. Even later, wireless relaying was performed at Kanazawa, Nagano and Niigata, but it was very unsatisfactory from the standpoint of tone quality and clearness. Researches in carrier telephone systems proved their transmission characteristics to be much the better and furthermore that this system was economically advantageous ; so wireless relaying was discarded, and the line relaying system was put into service. Consequently, all relayed broadcasts in Japan are by line relaying, and only the broadcasts relayed from Chosen and Taiwan (Formosa) resort to wireless relaying. But in order to be prepared to complete the broadcast in case of damage to the lines, each station is equipped with a wireless relaying receiver ; this is also an emergency receiver to insure connection with the nearest station in case of disasters or other emergencies.

The relay network in Japan is shown in Figure 6. Special light-loaded cable lines are used on the Tokyo, Osaka and Nagoya network; a medium-loaded cable is used between Osaka and Kyoto; and uniform-loaded submarine cables are used between Moji and Shimonoseki and between Aomori and Hakodate. Other than these, overhead bare wire lines or carrier telephone lines are employed.

The cable between Osaka and Tokyo, approximately 600 kilometers, is a special four-wire light-loaded line rebuilt to transmit with comparative smoothness a band of 120 to 4,400-cycles; recent plans will make the line capable of transmitting satisfactorily up to 8,000-cycles. The losses occurring in the lines during transmission are compensated to the required degree by four-wire repeaters at each repeating station, and since the out-going and incoming lines are separate, there is little cross-talk while permitting simultaneous transmission and reception. Figure 7 represents one example of the transmission characteristics. Moreover, between Tokyo and Osaka another similar relay line has been added accompanying the establishment of dual broadcasting, besides an extra line for incidental use which affords the necessary mutual contact among the stations.

TABLE III

Section	*Length (km)*	*Terminating Station*	*Type of Set*
Nagoya—Kanazawa	322	Nagoya Kanazawa	BC No. 1 ,, No. 2
Okayama—Tokushima	129	Okayama Tokushima	,, No. 1 ,, No. 2
Tokushima—Kochi	157	Tokushima Kochi	,, No. 1 ,, No. 2
Tokyo—Nagano	245	Tokyo Nagano	,, No. 3 ,, No. 4
Nagano—Niigata	212	Nagano Niigata	,, No. 4 ,, No. 3
Hiroshima—Matsue	176	Hiroshima Matsue	,, No. 5 ,, No. 6
Kanazawa—Fukui	86	Kanazawa Fukui	,, No. 7 ,, No. 8
Sendai—Akita	279	Sendai Akita	,, No. 7 ,, No. 8
Akita—Aomori	208	Akita Aomori	,, No. 7 ,, No. 8
Hakodate—Sapporo	278	Hakodate Sapporo	,, No. 7 ,, No. 8
Sapporo—Asahigawa	98	Sapporo Asahigawa	,, No. 7 ,, No. 8
Fukuoka—Nagasaki	165	Fukuoka Nagasaki	,, No. 7 ,, No. 8
Tokyo—Maebashi	117	Tokyo Maebashi	,, No. 7 ,, No. 8

Between Tokyo and Sendai and westward of Osaka overhead bare-wire lines are used, employing 3.5 millimeter hard-drawn copper wire, having a total length of about 1,200 kilometers. There are two sets of lines, one for relaying work and the other for incidental communications. All lines have been installed as far away as practicable from other electrical lines in order to avoid inductive interference.

The use of carrier telephony for relaying in lieu of the wireless relaying system has been indeed realized, but at present only one channel is engaged, so that the inability of the stations to keep in touch with each other during a relayed broadcast is a disadvantage. The established broadcast relaying sections in accordance with this method are shown in Table III; there are four types of systems in the installations now used, and their carrier frequencies and transmission bands are listed in Table IV. Figure 8 shows the frequency characteristics of the Number 3 and Number 4 terminating sets used between Tokyo and Nagano and Numbers 1 and 2 terminating sets between Nagoya and Kanazawa. The transmitted range spans about 100 to 5,000-cycles, and the transmission characteristics are comparatively smooth over this frequency band. The band has been further widened for equipment Numbers 7 and 8, made to pass about 50 to 6,000-cycles. These terminal sets are installed at the toll station of the telephone exchange, where the voice frequency channel is extended to the broadcasting station. Between the broadcasting station and the telephone exchange, a line for monitoring is installed and so arranged that it may be switched to three uses: for conversation, for the sending and the receiving of programs; the operating condition may be observed directly at the broadcasting station by means of a pilot lamp.

The international broadcasts and oversea broadcasts between Japan and oversea countries were first performed through the agency of the Kemigawa transmitting station and the Iwatsuki receiving station, both of the Ministry of Communications. Since then, through the founding of the Kokusai Denwa Kabushiki Kaisha (International Telephone Co., Ltd.) the work is done on short-waves through the Company's Nazaki transmitting station and the Komuro receiving station. Between these transmitting and receiving stations and the Atagoyama studio of the Tokyo Central Broadcasting Station, connections are made by telephone cables through the Tokyo Central Telephone Station, and from the Atagoyama studio the broadcast is relayed to stations overseas. Regular oversea broadcasting started this summer with the 20 kilowatt transmitter at Nazaki, and many acknowledgments, have come from listeners on the Pacific coast of the United States. Stimulated by these experiences and desiring to expand the range, the Corporation has decided to increase the power of the transmitter to 50 kilowatts; it will be completed by next fall.

IV.—Main Work of the Gijutsu Kenkyujo

The Research Laboratory of the Japan Broadcasting Corporation is established for the purpose of engaging in studies upon

TABLE IV

System and Type	*Carrier Suppression*		*Fundamental Wave Transmission, Carrier Suppression*		*Carrier Transmission*		*Fundamental Wave Transmission, Carrier Suppression*	
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
Carrier Freq. Cycles/sec.	Modulation for Broadcasting and Contacting 12,400 Demodulation for Broadcasting 12,400 and for Contacting 10,000	Modulation for Broadcasting 12,400 and for Contacting 10,000 Demodulation for Broadcasting and Contacting 12,400	12,400	20,400	11,200	28,000	10,400	20,800
Frequency Band	For Broadcasting 12,400 to 17,600 For Contacting 12,400 to 17,600	For Broadcasting 12,400 to 17,600 For Contacting 10,000 to 7,600	12,400 to 17,600	20,400 to 25,600	11,200 to 16,400	28,000 to 22,600	10,400 to 17,000	20,800 to 27,100

radio technique as it generally relates to broadcasting, such as improvements in amplifiers, studios, transmitters, and antennas, the prevention of reception troubles, etc. It is located in Tokyo Prefecture at longitude 139° 36′ 30″ E and latitude 35° 38′ 13″ N. Starting in June, 1930, with research on the immediate problems, it has continued to to-day. Separate discussions of the main research topics are as follows :

(*a*) The MH Type Carbon Microphone : The carbon type microphones were nearly exclusively used at the commencement of broadcasting, but the double-button microphones gave a great deal of noise, and although the Reitz microphones built by the Marconi or Telefunken Companies possessed fairly good characteristics, their high cost and disadvantages regarding their repair caused a series of researches, which resulted in the successful production of the type MH carbon microphone mentioned previously. They are now used not only at all broadcasting stations but also have been distributed among schools, governmental offices, etc., and are giving much useful service. There are still a number of unsatisfactory points in microphones, and in desiring their general improvement all types of microphones have been investigated ; at present the previously mentioned ribbon microphone, possessed of the best characteristics, is now being intensively studied.

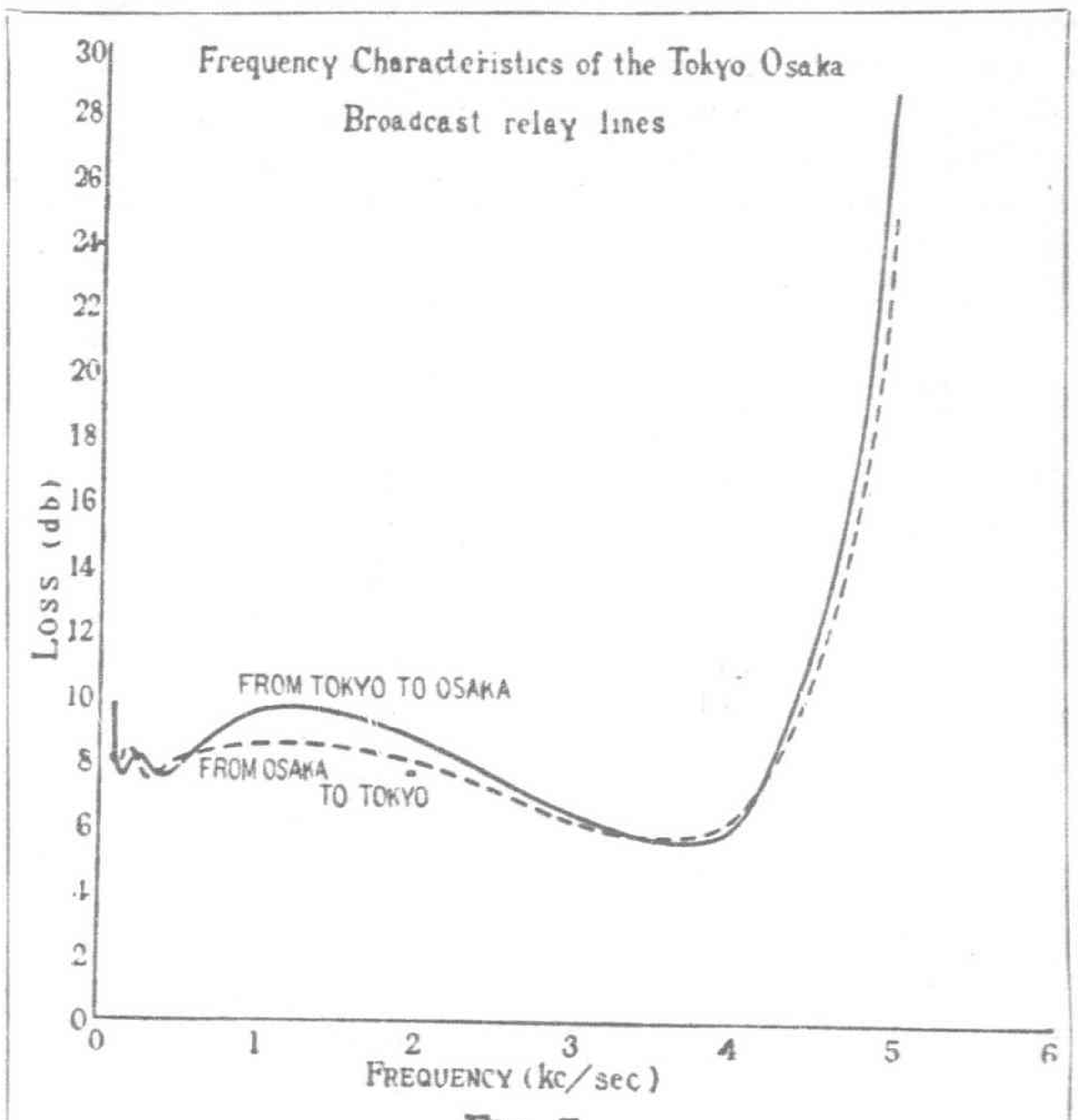


Fig. 7.

(*b*) Among problems related to studio accoustics, one of the most important and also difficult is the determination of optimum reverberation time. To study this, a warbling tone was used as a sound source to measure the reverberation period, and by the method of making oscillograph exposures, measurements were made at every broadcasting studio and some theaters. The proper reverberation periods for various types of programs were determined, and data concerning the design of studio rooms were obtained. In addition, such work as measuring the absorption co-efficients of various absorbing materials are being continued.

(*c*) Concerning common frequency broadcasting, the Corporation has experimented upon a method of quasi-synchronization employing individual quartz crystal oscillators at the two stations. And after considering the results, common frequency broadcasting was established at Fukuoka and Hakodate.

(*d*) With the antennas used at present, in spite of considerably strong field intensities at points 80 to 100 kilometers from the transmitting station, good night reception has not been obtained, and the sound quality is destroyed because of fading. This is produced by a low antenna radiating fairly strong waves at high angles, which waves after being reflected from the ionized layer interfere with the ground waves upon reaching the earth's surface. A certain degree of prevention may be effected by revising the antenna structure. The forthcoming 150 kilowatt broadcasting apparatus will, as has been given, produce very high field intensities, and in order to avoid any limitation in the service area due to such a destructive phenomenon, anti-fading antennas are to be erected. In co-operation with the Ministry of Communications and the Nihon Musen Denshin Kabushiki Kaisha (Japan Wireless Telegraph Co.), the Laboratory has engaged in experiments on vertical antennas. Important data were obtained including the facts that (1) with constant antenna input the antenna giving the highest daytime field intensity has a height of around 0.55 to 0.58 λ, and (2) to diminish near-by fading, the vertical antenna height must not exceed 0.58 λ.

(*e*) In view of ultra-short wave broadcasting and the dawn of future television broadcasts, the fact that they will present some very important problems has led the Laboratory to build transmitters at frequencies of 37.5 and 42.6 megacycles with antenna powers of 7.5 watts, 75 watts, and 200 watts for the purpose of studying the nature of ultra-short waves and the methods for their power amplification, quartz crystal control, etc. Field intensities in all directions have been measured, and the nature of propagation has been investigated. Over a period of a year transmission and reception tests have been carried out with the Keijo Teishin Kyoku (Regional Direction of Communications, at Keijo, Chosen), and the skip phenomenon of ultra-short waves has been observed ; these studies have drawn much attention. Low-power ultra-short wave radio telephony has been used at all stations the past several years for short distance radio relaying, and it has shown a favorable record.

(*f*) The necessity for incessant vigil over station frequencies arose as a consequence of the increase in broadcasting stations fixing the allowable fluctuation at less than 50-cycles. The Laboratory measures frequency variations through the detected beat frequency obtained from the propagated wave of each station and that of a crystal controlled standard frequency generator at the Laboratory.

(*g*) Investigations upon receiving equipment are also being continually performed. The construction and characteristic of new receivers are examined, and studies are made upon the trial manufacture of receivers possessing excellent operating characteristics combined with the least expense. Also concerning parts, as for example the audio-frequency transformer, the iron core which so greatly affects the frequency characteristic was considered, and high-ratio transformers using divided honeycomb coils were constructed and have given excellent performance. Inspection tests on receiving sets and apparatus are also made with the aim of elevating the quality of the articles.

(*h*) One of the important items for the progress of a broadcasting enterprise is to eliminate noises due to all types of electrical apparatus so that clear reception may be obtained. In consequence, the Laboratory studies effective means for noise elimination and has constructed standard preventive apparatus. A direction finder for the disturbing waves has also been made to facilitate the detection of noise origins. Rediffusion and wired radio broadcasts are also being studied as means for remedy.

(*i*) Since its opening the Laboratory has been engaged in various fundamental investigations and researches on television. Particularly through researches on sodium and other special photo-electric tubes, receiving sets made of these cells and the screw mirror have been experimentally built. Researches are at present in progress.

V.—The Present Status of Receivers

The D.C. type receivers employed during the beginning of broadcasting required troublesome maintenance and no little cost ; as a result the A.C. type sets became immediately popular in the cities and towns with the advent of A.C. tubes. To-day the D.C. sets are used only in remote regions where electric lines are unattainable or in special uses such as those of portable sets. Later, the remarkable development in vacuum tubes brought about the manufacture of sets that were several steps farther in advance. Low-power stations have been erected in every region, so that the field intensity is generally

(*Continued on page 278*)

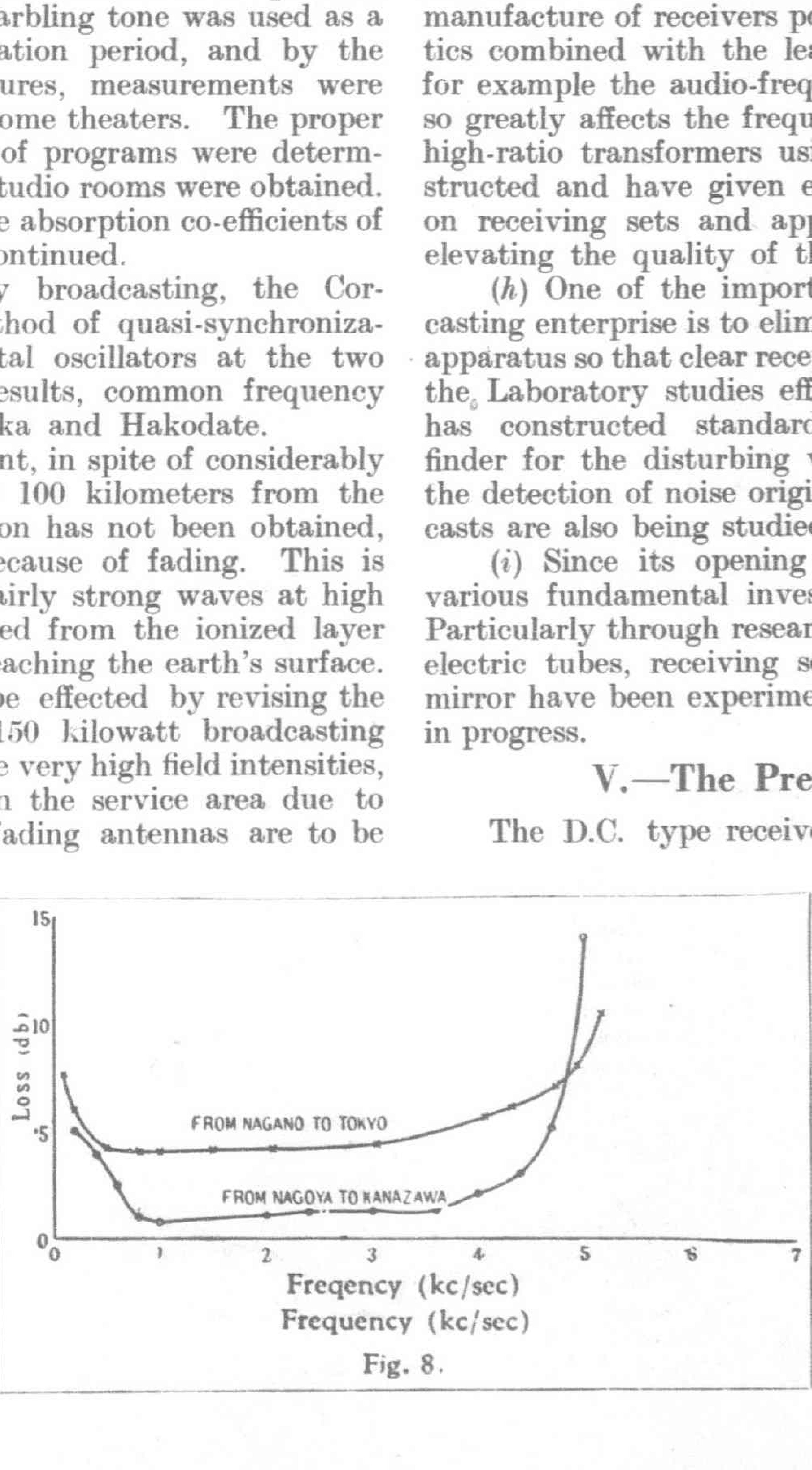


Fig. 8.

Fuso Bus Engines

Dr. Hiroshi Oinouye, Engineer, Kobe Dock Yard, Mitsubishi Heavy Industry Co.

In Japan as in many other places in the world there is an increasing demand for fast transportation. Road construction, which is being carried on throughout every district of the land has encouraged the development of the automobile—especially the development of buses for short distance transportation. At the present time the bus lines of the country may be considered as supplementary to the railroad system. The first Government controlled bus line was installed between Okazaki and Tajimi in December 1930. At the end of March 1935, the Government controlled 24 lines, extending over 1,161 km. and the number is increasing rapidly.

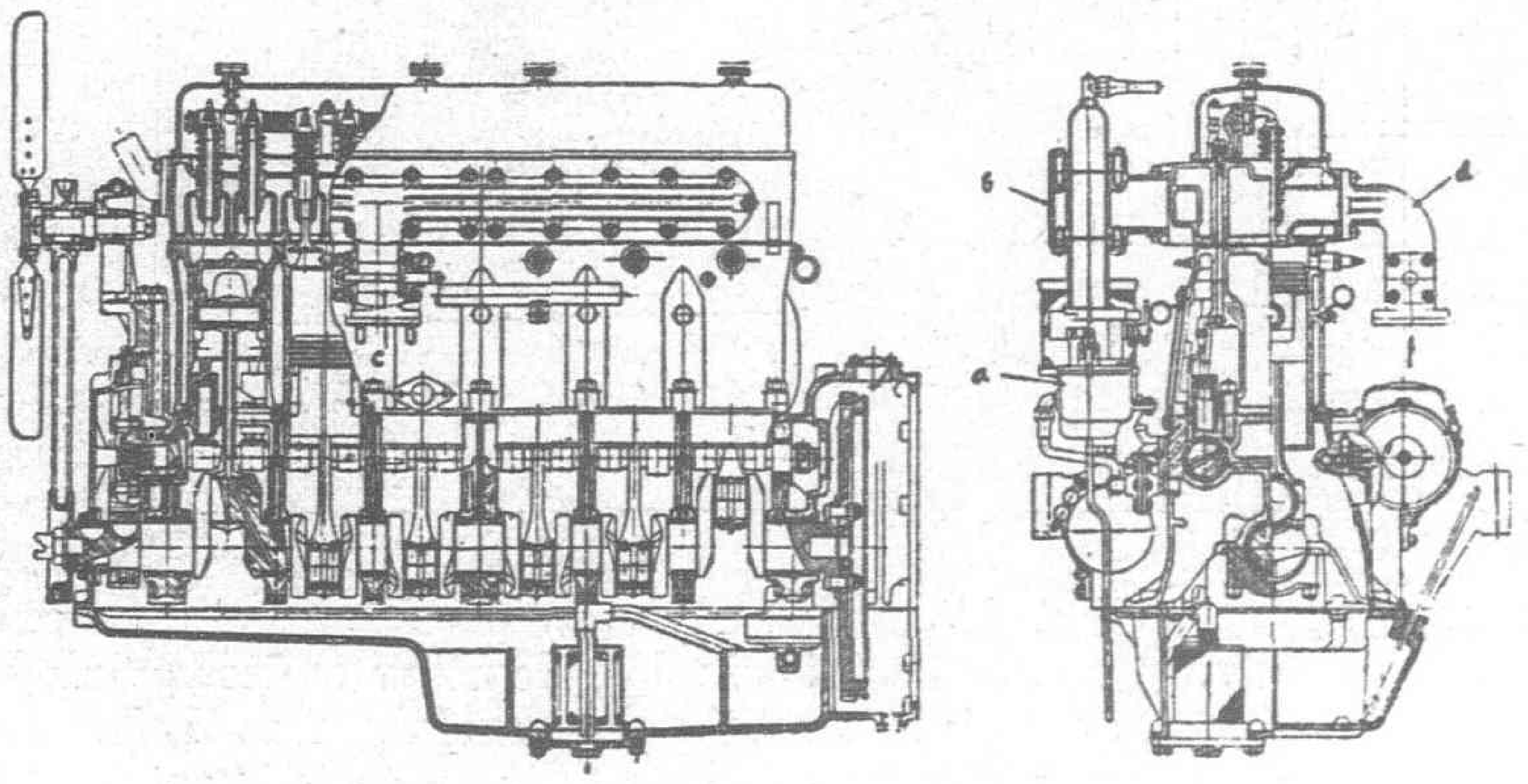


Fig. 3—Sectional View of "TU-6" Type Fuso Bus Gasoline Engine

Requirements for Government buses are:

1. Safety
2. Comfort
3. Equal opportunities for passengers
4. Punctuality in service
5. Economy.

These requirements necessitate an engine large enough to withstand considerable overloading. Not only in Government buses but in all bus services, larger types than those formerly employed are in demand.

There were approximately 121,000 automobiles in Japan in 1934, a very large proportion of which were imported. Foreign cars are not always suitable for the road conditions of this country. Furthermore, the Government is encouraging an industrial policy that will not leave the national defense dependent upon imported cars. Although the development of the Japanese automobile industry has been slow in the past, the rapid expansion of the present promises extraordinary development for the future.

The Mitsubishi Kobe Shipbuilding Works builds the Fuso bus to meet the requirements of Japanese buses.

The B46 bus is equipped with seats for 22 passengers and straps for 18 passengers. The wheel base is 4.6 meters, total length of the chassis 7.0 meters, width 2.19 meters, gross weight 5,800 kg. and the maximum load capacity is about 8,000 kg. In March 1935, there were more than 100 of these buses in satisfactory use in Government controlled bus lines.

The BS40 and BS43 type buses are equipped with S6 type 70 h.p. engines and have wheel bases of 4.0 and 4.3 meters respectively. Both of these types are used for medium sized Government buses and for large size city buses.

The 100 h.p. engine for the Fuso bus is a TU-6 type. It is a single acting, 4-cycle, head valve, water cooled gasoline engine. Its cylinder and cylinder head are one casting. As will be seen in Figs. 1 and 2, the carburetter, gasoline pump, and starting electric motor are arranged on the right side, while the water pump, generator, ignition apparatus, etc., are on the left side.

The water pump which is placed in the forward position is driven by the auxiliary driving gears and, through a flexible

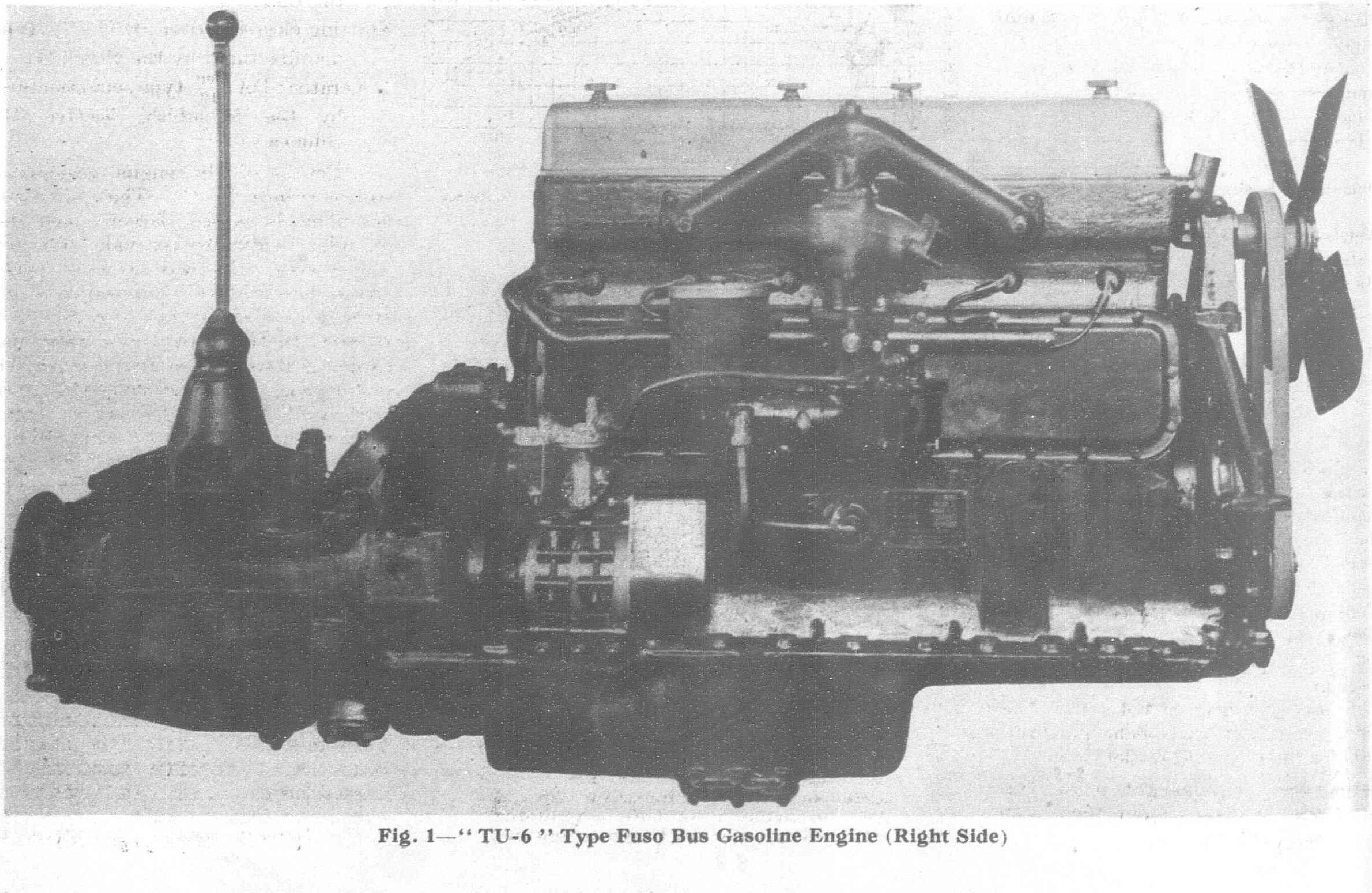


Fig. 1—"TU-6" Type Fuso Bus Gasoline Engine (Right Side)

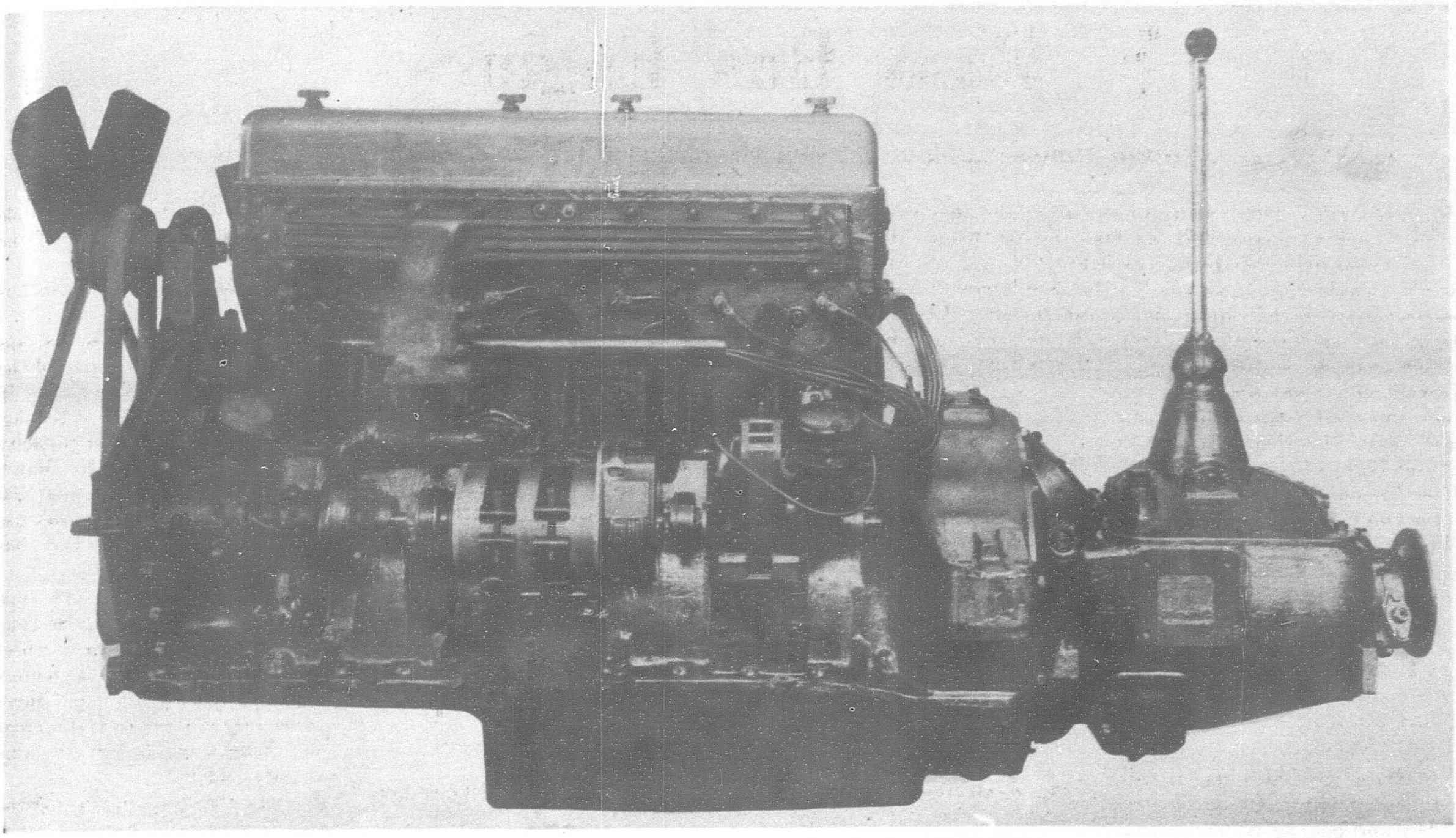


Fig. 2—" TU-6 " Type Fuso Bus Gasoline Engine (Left Side)

coupling, it actuates the generator and the ignition apparatus.

The specifications of the engine follow:

Number of Cylinders		6
Diameter × stroke		110 mm. × 135 mm.
Total displacement of the piston		7.7 litre
Compression ratio		5.0
Number of crank bearings		7
Dimension	height	994 mm.
	width	692 mm.
	length	1,350 mm.
Weight (including the fly wheel)		548 kg.
Maximum output (approximately)		100 h.p. at 2,200 r.p.m.
Maximum speed (approximately)		80 km. per hour at full load.

Nickel-chromium cast iron is used for the cylinder, cylinder head, exhaust manifold, etc., the crank chamber and the bearings are castings of Silmin, a special light alloy. The piston is made of heat-treated, cast Y-alloy (an aluminum nickel heat-resisting light alloy), the cranshaft and connecting rod are nickel-chromium steel drop-forgings.

Case-hardening nickel steel is used for the camshaft, and silchrome steel is used for the inlet and outlet valves.

Carburetter: Up-draught V-34 type, made by the Japan Carburetter Manufacturing Co.

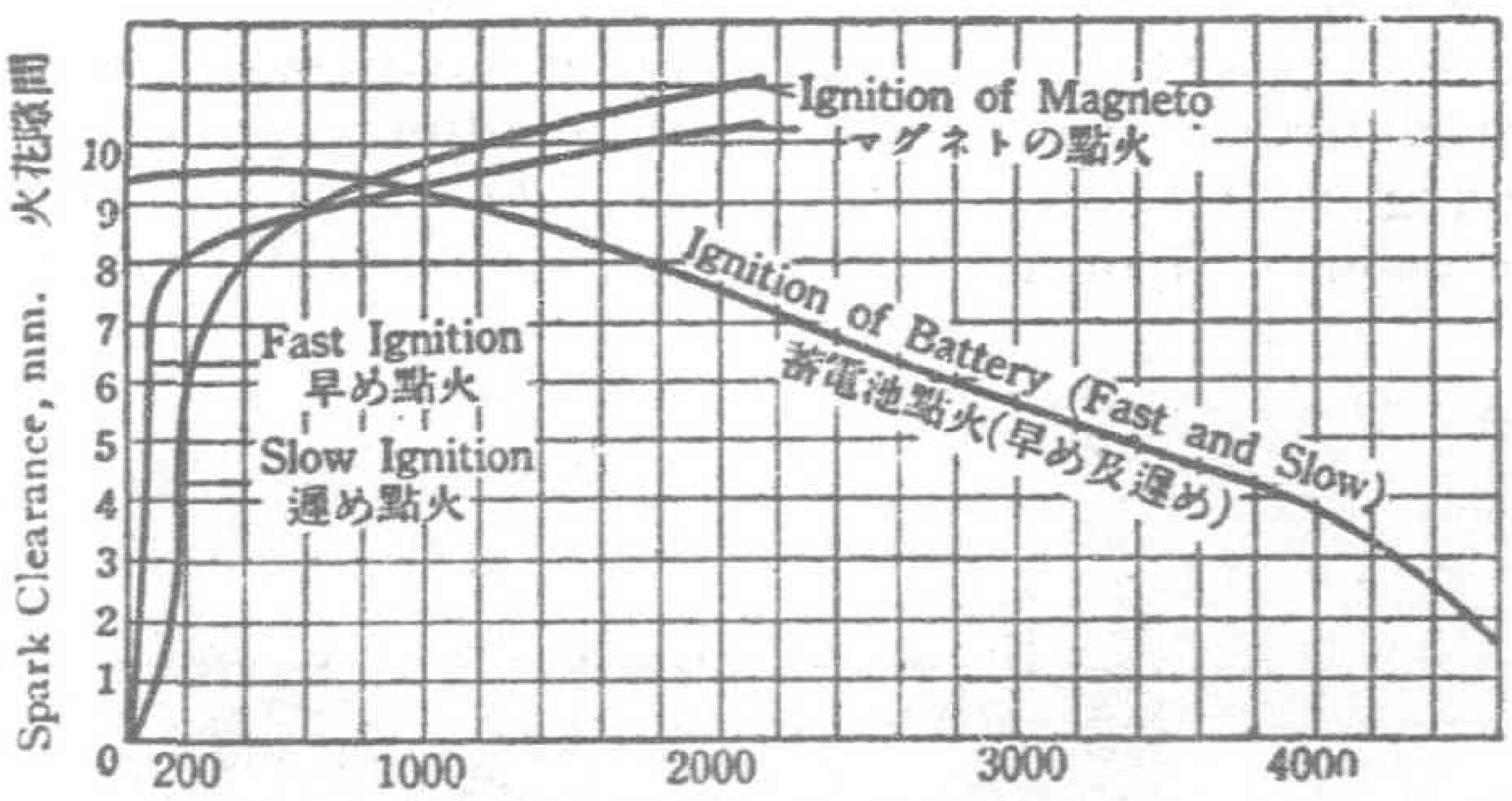


Fig. 4—Spark Strength of Ignition of the Battery and Magneto

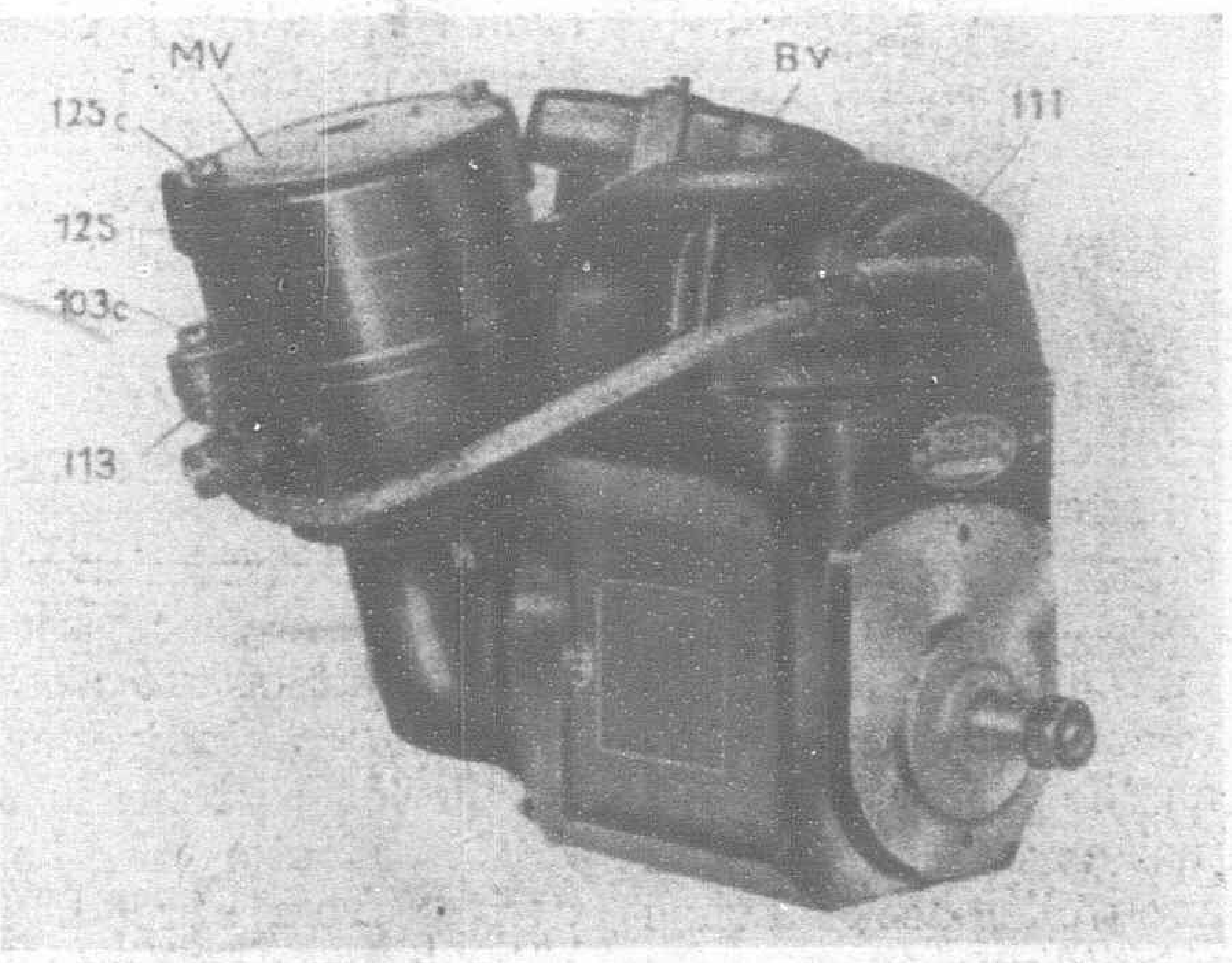


Fig. 5—JRZ-6 Magneto for Twin Ignition

103c—Screw for fixing distributor disc
111 —Brush holder
113 —Distributor disc
125 —Cover for distributor disc
125a—Screws for fixing cover 125
BV —Distributor for battery ignition
MV —Distributor for Magneto ignition

Gasoline pump: Diaphragm pump, p-1-U type, made by the Japan Carburetter Mfg. Co.

Ignition apparatus: Type JRZ-6 magnetos for twin ignition, made by the Bosch Co.

Starting electric motor: BNF $\frac{2.5}{12}$ type, manufactured by the Bosch Co.

Generator: DA $\frac{300}{12}$ type, manufactured by the Mitsubishi Electric Machinery Co.

Details of the engine mechanism can be seen in Fig. 3. The combustion chamber is made larger than the cylinder body, to provide sufficient valve area. In case a valve spring fractures accidentally, no trouble occurs, since an undercutting is provided to prevent the fractured valve fragments dropping in on top of the piston. The water jacket extends down to the lower part, and thus the piston is cooled efficiently. The combustion chamber is machined with exactness. The compression ratio is well balanced throughout all cylinders.

Ignition system: A statistical report of automobile breakdowns is given below. Breakdowns caused by defective ignition systems occupy a prominent place.

Year	*1925*	*1926*	*1927*	*1928**
Parts disabled				
Ignition apparatus	22.7	22.5	21.0	22.7
Carburetter	3.0	2.5	2.6	2.6
Axle	12.4	12.6	13.6	13.8
Miscellaneous	13.1	14.1	14.2	13.5

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*The Automobile Engineer, May 1931, p. 197

Many of the Government bus lines connect with the train schedules, therefore it is imperative for them to be dependable. Regardless of cost the best ignition system must be used in these buses. In both the battery system and the magneto system the intensity of the spark is dependent upon the speed of the engine (Fig. 4). The battery system is less expensive to install and gives a stronger spark on starting, but decreases rapidly in intensity as the engine increases in speed and besides, batteries wear out.

The TU-6 engine has a modern twin ignition magneto system in which two spark plugs on each cylinder are ignited simultaneously by a battery and a magneto (Fig. 5).

The ignition timing is controlled by means of an automatic ignition lever and a hand control. This insures proper ignition both for level and for climbing roads.

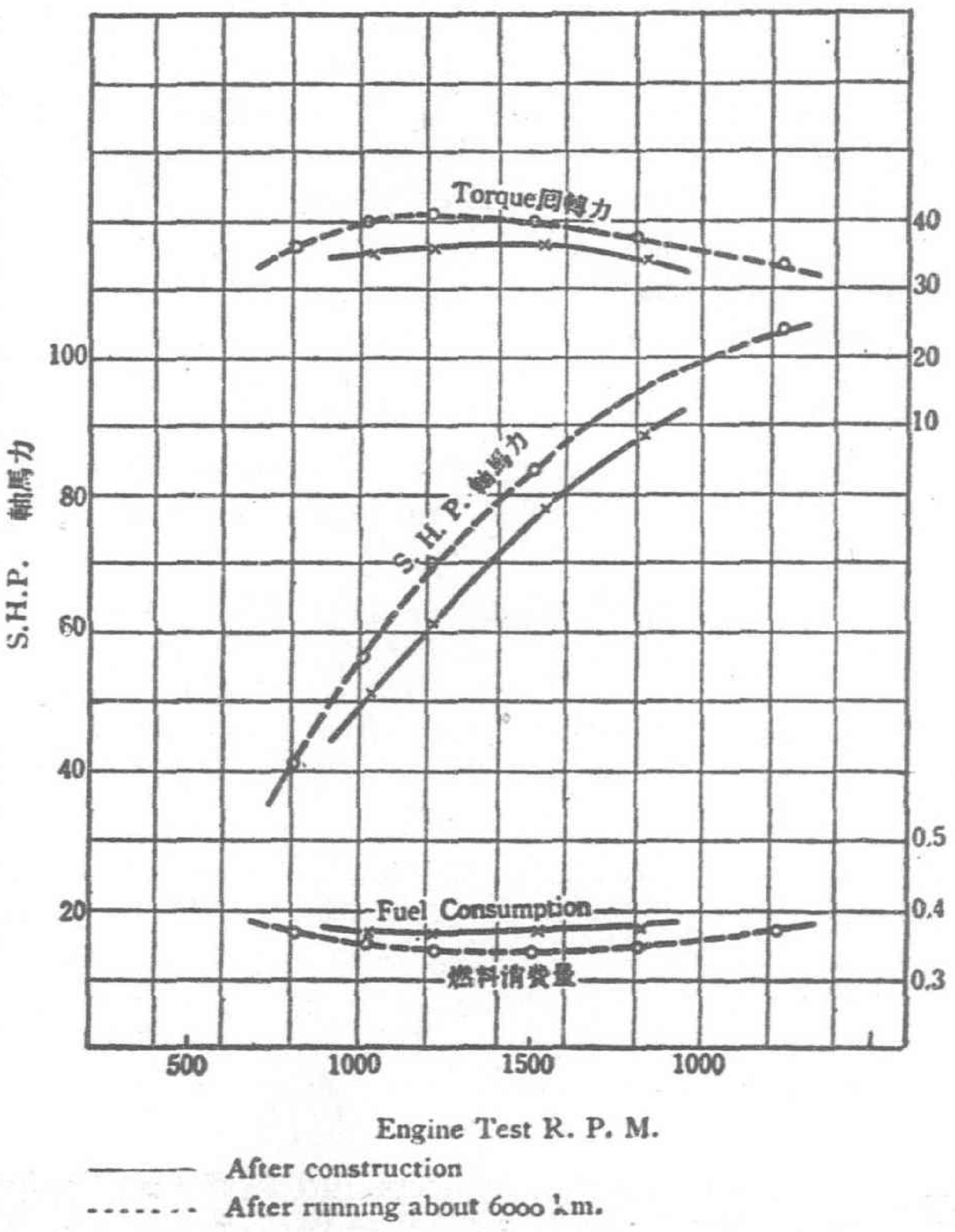


Fig. 6—Results of Test for "TU-6" Type Engine

The results of engine tests made in the factory are shown in Fig. 6. Better results, as shown by dotted lines in Fig. 6, are obtained after the engine has been properly broken in.

A running test made to cope with a capacity load showed that the car can go 3 to 3.3 km. on one litre of gasoline.

In this engine as shown in Fig. 3 suction gas from the carburetter (*a*) is heated by the exhaust gas in the heating tube (*b*). The rate of heating is regulated by means of a regulating valve (*c*). This makes the engine usable in any climate.

Modern Elevators in the Far East

(Continued from page 268)

present no obstacles to the construction of these lifts. Gearless machines with direct current control are frequently used and the quality of service procured is so good that cargo lifts are frequently utilized as passenger carriers during periods when cargo is not transported. Self-levelling is of paramount importance in the case of cargo machines, as this feature maintains the lift platform level with the landing while cargo is being handled, taking up cable stretch while loading necessary in the case of heavy trucks.

Accessories and signals are to-day of great importance in successful lift operation; automatic control requiring various push buttons, indicators, lights, etc., while larger installations require scheduling devices also. Automatic door operation is now common, both on ordinary small lifts as well as the large fast speed installations. Double deck lifts are also in use as well as two lifts in the same well, these being developed to save well space and thus permit of more rentable space in tall narrow buildings.

The problems met by the lift manufacturer are many as lifts are by no means confined to buildings of the standard type. Lifts are regularly installed in ships where conditions are quite different from those found in buildings, in mines, in furnaces, in wells for water, up mountainsides, in caves, in bridge towers, in monuments, in churches and in fact wherever vertical transportation is required, lifts are now supplied.

The Hair of the Dog

(Continued from page 246)

of the Stimson Doctrine and its acceptance by the League, aligns the Nations with China and against Japan, leaving no loophole for independent negotiations, except on China's terms. These Japan will never accept. The danger to world peace, cannot be regarded as removed until China and Japan are induced to come together for a settlement of their differences. A resumption of armed strife, with its useless waste of life and treasure is almost certain if the terms of the truce are violated. Unless the Nations are prepared to back up their condemnation of Japan with force or the application of economic sanctions, further encouragement of China to resist Japan must inevitably lead to another crisis. It is time, as the Spaniards say to *andar con pies de plomo*, to walk very slowly, very cautiously. For, all signs point to the ominous certainty that Japan is preparing for any emergency.

The Present Status of Broadcasting Installations in Japan

(Continued from page 275)

increased in the districts heavily populated with listeners. Consequently, the greatest number of listeners use what might be termed a standard type of receiver, employing an eliminator, regenerative detection, and one or two stages of audio-frequency amplification (224, 247 B, and 112 B tubes or 227, 226, 112 A and 112 B tubes are used). With the appearance of tetrodes and pentodes, radio-frequency amplification became easier; the increase in the number of broadcasting stations raised the necessity of sharp selectivity, and recently many higher class sets employing superheterodyne systems have come to be popular. In loudspeakers, the horn type used in the past has been completely discarded, and magnetic cone speakers are in use, with the dynamic speakers steadily becoming popular. Particularly the appearance of multi-electrode tubes, accompanying the improvement of all parts, making it possible for one tube to do the work of two or three former tubes, caused the receivers to gradually become smaller, and the popularization of the so-called midget sets with self-contained speakers has been brought about. In other countries combination A.C.—D.C. receivers that can be readily used on either D.C. or A.C. lines are being manufactured, but in Japan, aside from the interest taken in the fact that they do not require power transformers, there does not seem to be a general demand for them.

Although the D.C. receiver was temporarily overshadowed by the development of A.C. receivers, in a case of emergency, such as when the power supply ceases, the A.C. receiver is entirely useless. And in view of the fact that the broadcasting stations are equipped with their own power plants for just such rare occasions, the necessity for the broadcasting system to be more active than ever during such a situation is obvious. Thus the value of a D.C. receiver for emergency use has been additionally supported, and researches in this field, with the improvement of tubes to operate satisfactorily on low power, have produced completely new D.C. receivers entirely different from their predecessors.

Reconstruction in Kwangtung

The Commissioner of Reconstruction in a report on the progress of the three-year plan for the reconstruction of Kwangtung says the output of the weaving and knitting factories in the province is finding a ready market. A sulphuric acid plant, with a daily output of 15 tons, is working full blast, while paper mills and a fertilizer factory will be put into operation as soon as the machinery arrives from abroad. Private industrial enterprises, particularly silk filatures and mining companies, also have received attention, and a commission for their protection recently was appointed. The provincial government is encouraging the opening of coal mines, while the building of 100,000 miles of new highways is projected. At the same time, more powerful broadcasting stations will be built and all long-distance telephone lines extended. Three more weather stations are to be established, one at Swatow, another at Peihoi, and the third at Sanya.

The Generation and Distribution of Electricity in Singapore

By E. W. P. FULCHER, M.B.E., A.M.I.E.E.

(The following is a Paper presented to the Singapore Section of *The Engineering Association of Malaya* in April, 1934)

THE first supply of electricity to the city of Singapore was provided by the Municipal Commissioners in 1905. A Low Tension D.C. bulk supply was taken from the Singapore Electric Tramways Company's Generating Station in Mackenzie Road by underground feeders to a Substation equipped with balancers in Coleman Street, current from there being distributed by a three-wire direct current network.

In 1912 it became evident that the supply from this source was quite inadequate to the needs of the city and that the D.C. system for the residential areas was out of the question, and the Singapore Electric Tramways, Ltd., were approached as to whether they would instal additional plant. They agreed to put in two Diesel oil engines and one motor generator for this purpose and give a supply at 3,000-volts. This plant was installed but owing to financial reasons, the scheme for extensions to the Suburban area was held in abeyance. Owing to the advent of the Great War nothing more was done in this direction until in 1919 a L.T. A.C. supply was given to Mt. Sophia district and in 1921 an E.H.T. ring main was laid and energized and Low Tension A.C. current was delivered from four Substations situated in Killiney Road, Chatsworth Road, Dalvey Road and Newton Road.

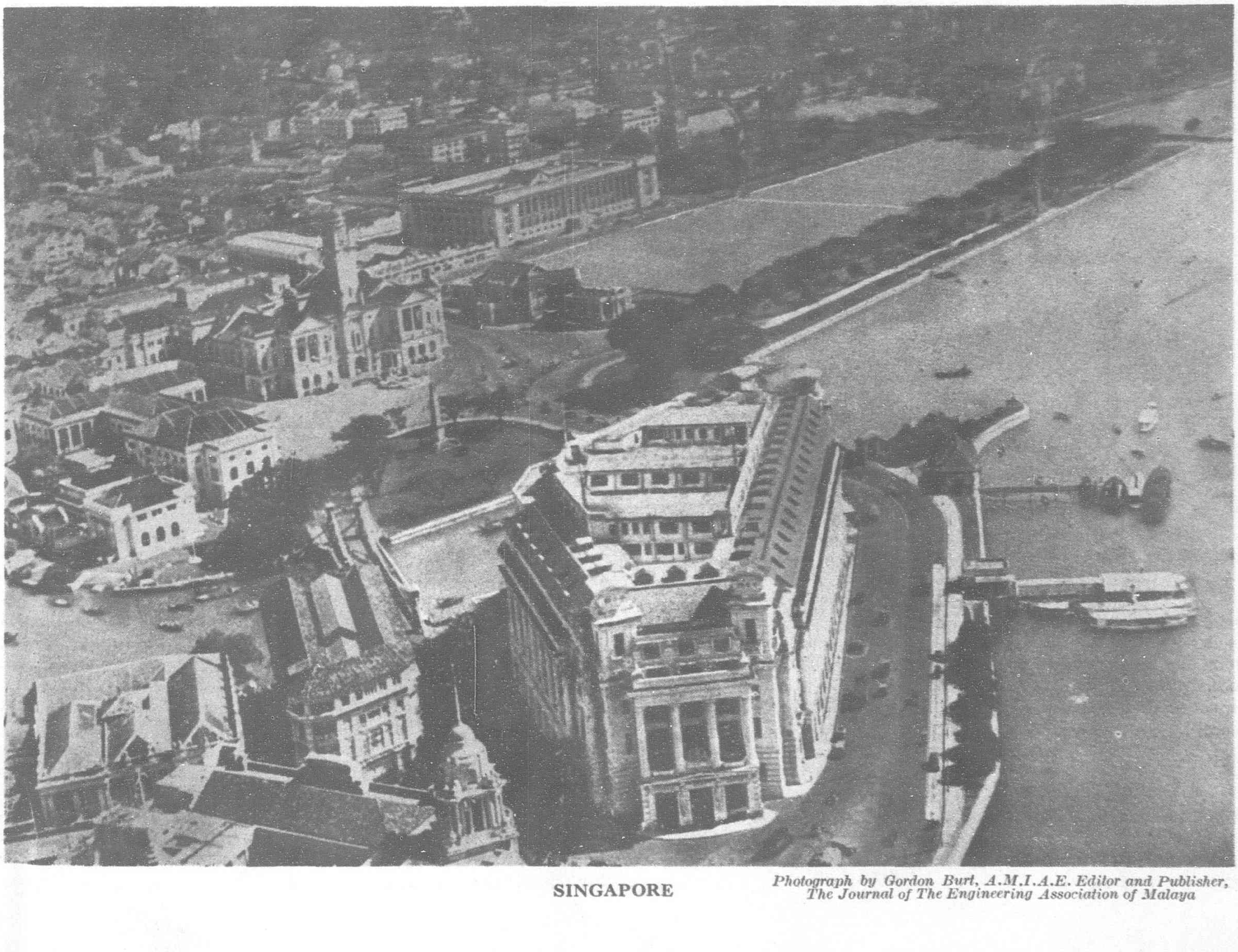
However at this time the Tramways Co. were unable to install more plant at their Generating Station for financial reasons, and as the whole of their existing plant was fully loaded it became necessary to review the whole position. The matter in 1921 was brought to the notice of Government who instructed a Committee to draw up a report and submit recommendations.

The recommendations of the Commission involved the construction of a new Power Station by the Municipal Commissioners, extension to the existing D.C. and A.C. networks and an extended system of E.H.T. Mains and Substations for the distribution of Alternating Current for lighting and power.

After carefully considering a number of possible sites for the Power Station, Cape St. James was selected as being the most suitable for the purpose in view.

In order to meet the public demands and at the same time build up the load for the proposed Power Station an agreement was entered into in June, 1924, with the Singapore Harbor Board for a bulk supply of E.H.T. Alternating Current at their generating Station at Keppel Harbor.

The agreement provided for a maximum load of 2,000 kw. and with this additional load available it was hoped to meet all the demands of the public until the new Generating Station could be put into operation. Orders were immediately placed for E.H.T. Switchgear and two 1,500 kva step up Transformers for the equipment of a main Substation adjoining the Board's Power Station and for cables and substation equipment for the distribution system.



SINGAPORE

Photograph by Gordon Burt, A.M.I.A.E. Editor and Publisher, The Journal of The Engineering Association of Malaya

Plans and specification were then prepared for the buildings and plant for the new Power Station and the site was acquired from Government.

Supply from the Harbor Board's Power Station was commenced on July 8, 1924, and supply disconnected from the Tramways Co., by July 27, 1924.

However the load had increased to such an extent that the 2,000 kw. as agreed to with the Singapore Harbor Board was almost reached on the first night and the Municipal Commissioners asked the Tramways Co. to continue the supply which they agreed to do until St. James was able to generate.

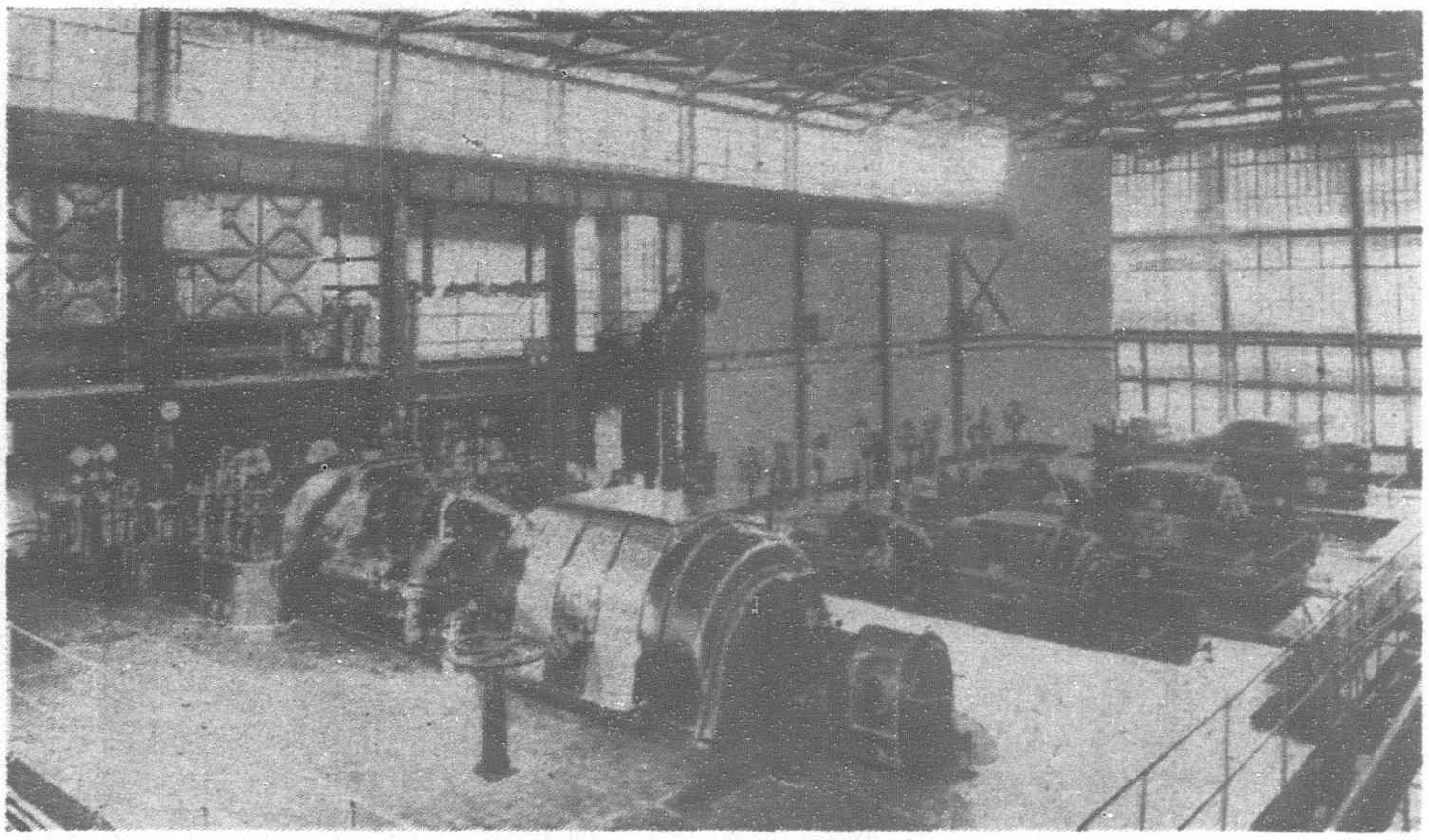
The completion date for the station was arranged for March, 1927. But in view of the position an effort was made to bring the first unit into operation as early as possible and on September 30, 1926, the first of the generators was put into commission thereby relieving the situation (The load had grown to such an extent that restriction of supply during the peak load had to be enforced in June, 1926).

A few days later the Municipal Commissioners discontinued taking any electrical energy from the Singapore Traction Co.

St. James Power Station started generating for the whole of the existing system on June 1, 1927, and the agreement with the Singapore Harbor Board was terminated on the 30th of the same month.

Owing to the rapid growth of the demand which is bound to arise when the reduction of the charges for electrical energy has taken effect, the Municipal Commissioners in June 27, authorized an extension of plant by the addition of one 10,000 kw. turbo-alternator, two boilers, etc., which were erected and running in July 12, 1929. If the demand continues to increase as at present, another set of similar capacity will have to be ordered in a year or two.

In 1931 the extension of the building was commenced and was completed at the end of 1932.



The Turbine Room of the Singapore Power Station

St. James Power Station

The site at St. James is almost an ideal one for a large Power Station, and the only drawback was the necessity of driving piles in the filled portion on the West side.

The site has an area of about five acres. The close proximity of the area gives special value to the site from a Power Station point of view, as an unlimited quantity of water for condensing purposes is available ; also sea borne coal can be delivered within a few yards of the station.

A connection with the F.M.S. Railways also provides for the delivery of locally mined coal and for the transport of materials and plant. The present year's contract for coal come from the Malayan Collieries Ltd., Batu Arang Mine.

General Lay Out

The building comprising boiler house, pump room, turbine room, control room and switch house is arranged facing East and West. The boiler house, turbine room, switch house all lie parallel with the Straits separating Singapore and Pulau Brani.

Buildings

The building is a steel framed structure supported on reinforced concrete piles with run beams and designed for a wind pressure of 50 lbs. per sq. foot. The walls are of pointed brickwork and the floors are reinforced on concrete slabs supported on steel joists.

The roof immediately over the E.H.T. oil switch room is of fire proof construction and all other roofs are of steel covered with asbestos corrugated sheeting. Steel windows and louvres are provided throughout for light and ventilation.

The interior of the Turbine Room and Low Tension Switch Room is lined with glazed tiles up to a level of about 15 feet above the floor line.

Coaling Arrangements

The space set apart for coal storage is capable of accommodating 4,000 tons in heaps of moderate size and height. Narrow gauge trucks run between the coal heaps and along the quay wall to the coal elevator. Coal is loaded into tipping trucks at the heaps and taken to the receiving hopper of the coal elevator by manual labor.

This space will be altered considerably when the Singapore Harbor Board have completed their wharf extension scheme, as almost the whole coal yard will be handed over to the Board in exchange for two coal yards placed one at each end of the building.

A quay wall has been constructed extending from the sea to the boiler house which will accommodate six fifty ton lighters.

The trucks of coal are run over a weighbridge which automatically registers the weight of coal in each truck ; the coal is then tipped into a hopper and raised by means of a bucket elevator to two overhead bunkers at the permanent end of the boiler house.

The boiler plant is designed to burn low grade fuel and as this class of coal is practically all slack no crushing plant has been installed. It may become necessary for various reasons later on to burn a higher grade fuel when a coal crushing plant will have to be installed.

Boiler House Equipment

The boiler house which is 190 feet long by 88 feet wide is designed for two rows of six boilers with a central firing gangway. At the present time, eight boilers have been erected. Each boiler will evaporate at a normal working load 40,000 lbs. of water per hour at a pressure of 250 lbs. per sq. in. super heated to a temperature of 650° Fah. Each boiler is provided with two mechanical stokers of the chain grate type, integral superheaters and super-imposed economizers. Coal meters are fitted to each grate.

The gases from each boiler after they leave the economizer pass through a short up take flue to a steel chimney. One chimney is provided for each pair of boilers. Dust and grit extractors of the cyclone type are incorporated in each chimney and the grit and dust extracted from the flue gases is taken down to the basement by pipes.

Each chimney is eight feet in diameter, the tops of the chimneys are 96 feet from the firing floor level and 108 feet from the ground floor.

The boiler furnaces are worked on the balanced draught system with atmospheric pressure above the fire. A separate forced draught fan in the basement delivers the air under pressure into compartments below the grates of each boiler and a separate induced draught fan between the economizer and chimney draws the gases from the combustion chamber and discharges them up the chimney. All the fans on each boiler are controlled from the firing floor.

A system of dust and soot removing plant has been provided. Steam jet blowers are used for the boiler, superheater and economizer tubes.

The ashes are received in hoppers at the back of the grates and fall directly, through sealed chutes into a water trough conveyor for each line of boilers. The conveyor lifts the ashes to external hoppers from which they can be removed either by lorries, carts or railway wagons.

At 31 feet above the firing floor there is arranged along the center bay of the boiler house, an electrically propelled coal lorry which traverses the runway which extends the whole length of the boiler house from below the coal bunkers.

Coal is discharged from the bunkers into the lorry and is delivered to the boiler hoppers as required. The capacity of the lorry is ten tons and can be operated either from a cage or by hand from the firing floor.

Oil Burning Equipment

The burners are arranged in the back casings of the boilers six burners to each boiler.

Feed Water Plant

The boiler feed water plant is located in the pump room between the boiler house and turbine room. Three turbine driven feed pumps have been erected each having a capacity of 150,000 lbs. of water per hour against full boiler pressure and one electric feed pump having a capacity of 300,000 lbs. of water per hour. Duplicate feed pipes run down each side of the boiler house with connections to the various economizers and boilers.

Every precaution has been taken to prevent the access of air to the feed water system. Two covered hot well tanks and one covered storage tank are erected on the hot well floor above the pump room. The condensate from the turbines after passing through heaters is pumped at a temperature of about 180° Fah., into the closed hot well tanks from which the feed pumps are supplied.

The make up water is taken into the storage tanks supplied from the town mains and from there to the hot well tanks through submerged pipes. The supply is controlled by ball valves.

The exhaust steam from the boiler feed pump is led direct into the hot well tanks.

The overflow pipes from the storage and hot well tanks are not led directly to atmosphere but are first sealed in subsidiary tanks situated in the pump room the overflow from which goes into the drainage system.

What would normally be the air spaces between the levels of the water in the closed hot well tanks and the covers of the tanks is kept filled with steam at a low pressure by a branch from the exhaust pipes of the feed pumps.

Small vent pipes are taken from the covers of the hot well to over tun dishes near the feed pumps and by means of valves on the exhaust branch steam can be regulated so as to be just visible.

This will prevent the inlet of any air to the hot well tanks whatever the level of the water.

Blow Down Arrangements

The boilers and economizers are emptied or blown down into a large steel tank with a 12-in. atmospheric pipe to relieve all pressure. The drain from the blow down tank is arranged so that the tank is always about half full of water.

The feed pump and other drain piping connected to the tank is taken by internal pipes below the level of the water which provides a seal and prevents egress of steam from the open tun dishes into the building when a boiler is being blown down.

Turbine Room Equipment

The present turbine room is 190 feet long by 59 feet wide. It contains four main turbo-alternators, one of 10,000 kw. (12,500 kva), two each of 5,000 kw. capacity (6,250 kva) one of 2,000 kw. (2,500 kva) at a speed of 3,000 revolutions per minute.

The main alternators generate three-phase current at 6,600-volts between phases and 50-cycles per second.

Surface condensers are provided for the main turbines with air pumps of the steam ejector type and water extraction pumps driven by electric motors.

The condensing plant is designed for a vacuum of 27.75 with the barometer at 30 inches.

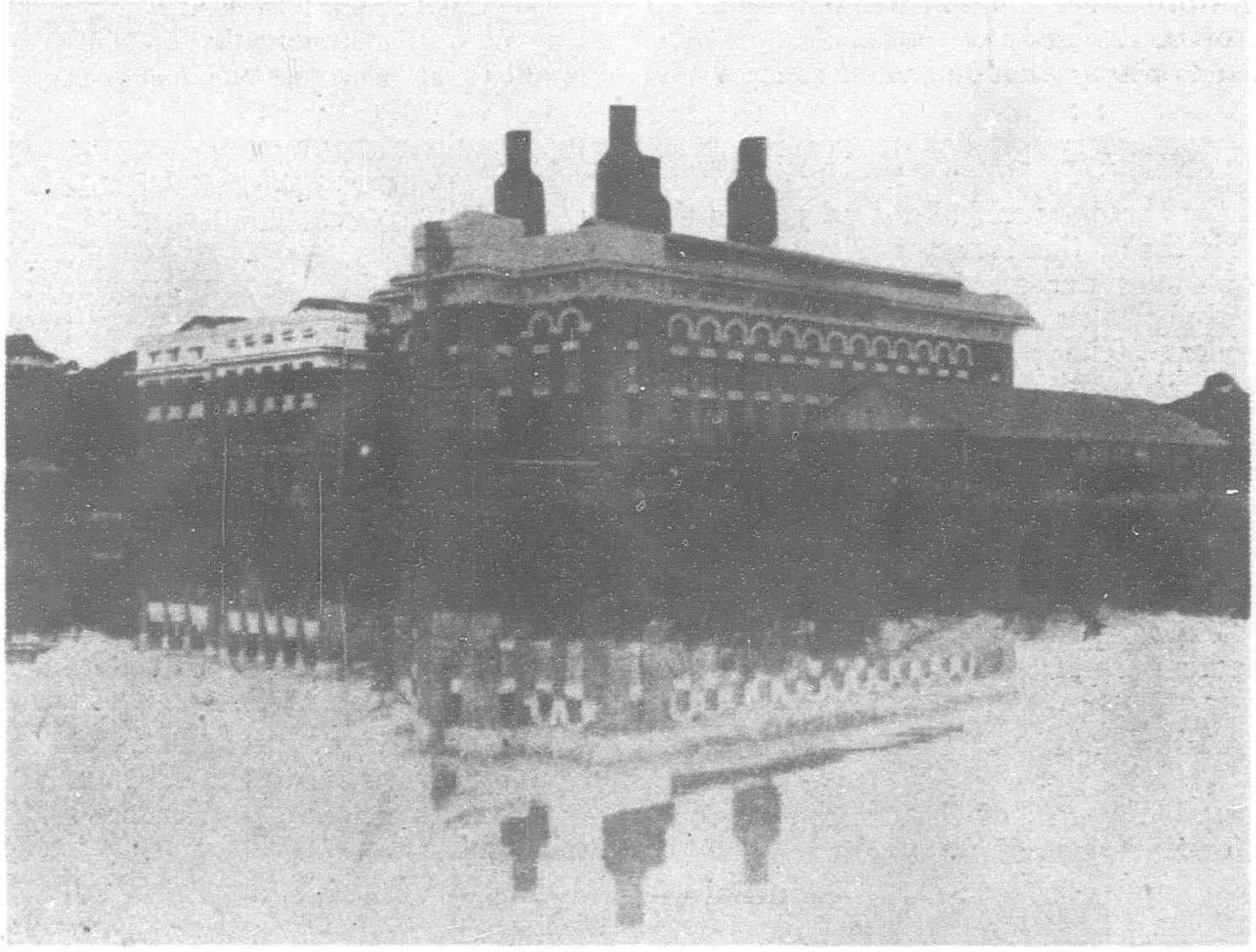
Feed water heaters using the steam from the secondary stages of the air pumps are arranged in the condensate line from each condenser.

A closed system of air ventilation is used with each alternator with main tube coolers supplied from the main circulating water system.

The main turbo-alternators are erected on separate monolith concrete foundations rising 17 feet above the basement floor level.

A house set turbine driven is in the basement and is capable of carrying the auxiliary plant necessary in the event of a complete shut down.

A 30 ton electrically driven travelling crane is provided in the Turbine Room which is controlled from a cage.



The St. James Power Station at Singapore

Pipework

The whole of the steam pipes are of steel with flanges screwed on and expanded for pipes up to 4-in. diameter. All pipes over 4-in. have flanges rivetted.

The pipes have a continuous fall from the boiler stop valves to a main bus range run below the boiler room firing floor and from this to large separators in the turbine room basement mounted on steel balls supporting by flanges on adjustable springs; the pipes from the separators rise to the turbine stop valves.

The separators and steam ranges, main and auxiliary are drained by float traps; the discharge from the traps being taken to the hot wells.

The atmospheric exhaust branches of each turbine are connected through automatic valves to the atmospheric main which is carried outside and above the roof of the turbine room.

Oiling System

The bearings of the turbines are lubricated under pressure by gear driven pumps on each machine. The oil is pumped from tanks formed in the bedplates of each turbine through the oil coolers to the bearings. Emergency steam turbine and hand pumps are fitted to each machine. The cooling water is taken from the main circulating water system. Connections from the town mains are provided in case of emergency.

An oil filter is installed on the basement connected by pipes to the tanks on the turbine bedplates. The filtered oil is returned to the turbines by a small electrically driven pump.

Condensing Water System

The condensing water intake works are situated on the South side of St. James. The water flows through two concrete culverts each 5-ft. 9-in. in diameter to the screening chamber and from there through a short length of 8-ft. 0-in. diameter culvert to the intake channel inside the Station. From there the water is pumped through the condensers to the outlet channel which discharges through a six feet diameter culvert into Telok Blanga Bay on the East side of St. James.

The intake culverts are controlled by panstocks in the screening chamber, provision has been made for sealing either of the culverts at the sea end for the purpose of cleaning and inspection. Vertical bar screens are used where the inlet channels connect with the sea.

The screens are of the continuously moving band type and erected in the screening chamber. Two screens are provided at present. Provision is made for extensions to this plant.

The screening chamber is equipped with duplicate pumps for supplying water for cleaning the screens.

The debris which is washed from the screens is dealt with by the main drainage system.

Separate motor driven centrifugal pumps are used for each condenser with independent pipe lines.

The suction pipe of each pump is carried into the intake water channel and a closed system of delivery pipes leads the water to each condenser and back to the discharge channels.

Full advantage is taken of the syphonic discharge effect.

Auxiliary Plant

With the exception of the three steam boiler feed pumps the whole of the auxiliary plant in the station is motor driven by three-phase motors at 400-volts between phases.

The auxiliary power supply is normally obtained from two 1,000 kva. static transformers. The auxiliary turbo-alternator will be used to start up the auxiliary motors of either of the main turbines in the event of a total shut down of the plant.

A storage battery is installed for the emergency lighting of the station and for operating the E.H.T. switchgear. Signal lamps obtain their supply from a special motor generator.

The supplying to all auxiliary plant is by paper insulated lead covered, single wire armored cables.

The main E.H.T. Cables from alternators, transformers and neutral points of the alternators are also P.I.L.C. and single wire armored.

Switchgear

The extra high tension switchgear is of the armor-clad compound filled type designed for a pressure of 6,600-volts.

The floor space occupied by this type of gear is small which allows room on the same floor for considerable extensions.

Duplicate bus-bars are provided for the alternator and feeder circuits. A system of mechanical and electrical interlocks give protection against faulty operation of the switches. Indicating lamps are provided on this board and on the control board which show at a glance the position of all switches and the bus-bars to which they are connected.

The alternator oil switches are designed for 1,500 amperes per phase and the feeder oil switches for 800 amperes per phase, in each case at 6,600-volts. The oil switches will safely open under short circuit conditions with the station's ultimate working capacity of 40,000 kw.

The whole of the main switchboard is operated electrically from a control switchboard erected in the upper floor of the control room which commands a complete view of the turbine room. The operation is by Direct Current at 110-volts.

When the alternator has been switched in the switchboard attendant takes control of the speeds and the retention of the load by electrical control of the governors of the turbines.

Two iron grid resistances erected in an expanded metal enclosure in a room adjoining the battery room is used to earth the neutral point of the station of one or other of the running machines. The opening and closing of this switch is controlled by the switchboard attendant from the control room.

A red lamp is mounted on the control panel of each alternator and serves as an indicator to the attendant as to which alternator is earthed.

Balanced protection is used on the alternator circuits and split conductor protection also overload with definite time limit protection on the feeder circuits.

The low pressure auxiliary switchgear is of the ironclad compound filled type and is erected on the lower floor of the control room. It controls the low pressure side of the two station transformers, the motor generator, station lighting and all other auxiliary plant in the station.

Separate starting and control switchgear is mounted close to each individual motor throughout the Power Station. The motors operating coal elevator and ash conveyor can be instantly stopped from several points by pressing special trip switches.

Stores and Workshops

The basement floor of the switch house provides accommodation for stores and a workshop suitable for the usual repair and maintenance work of a Power Station.

Staff Accommodation

The first floor of the switch house is partitioned off for offices and lavatories.

Laboratory

A room in the switch house is to be fitted up shortly as a chemical laboratory with all the apparatus necessary for coal, ash, oil and water testing.

The top floor of the switch house is used as a Meter Testing and Standardizing Department.

Transmission System

Energy is transmitted from St. James Power Station at 6,600-volts by underground cables to sixty substations.

Eleven feeder cables have been laid from the station, ten consisting of .06 sq. in. 6-core, split conductor lead covered, paper insulated and armored and one of .15 sq. in. 6-core P.I.L.C. also split conductor.

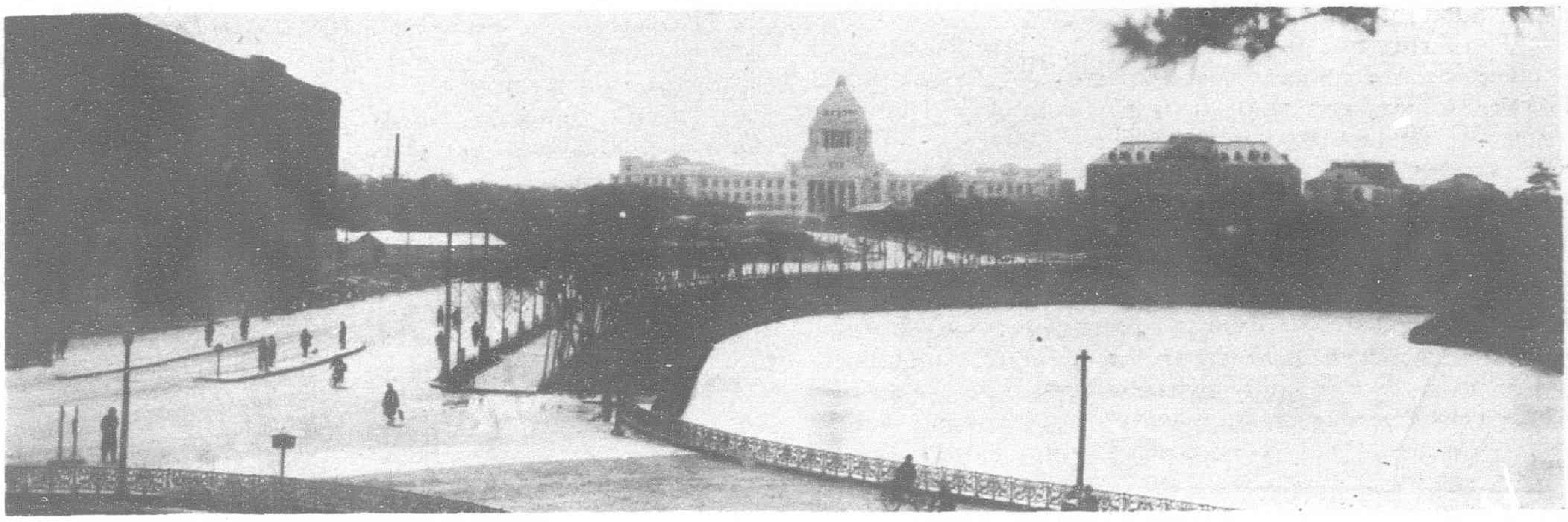
All substations are in telephonic communication with each other and with the Power Station by means of five pair or ten pair lead covered, paper insulated and armored cables laid in conjunction with the E.H.T. feeders.

A large proportion of the supply in the center of the town is given by direct current and rotary converters are used for this purpose which are in operation at George Street and Armenian Street substations.

The remainder of the town and outlying districts are supplied with low pressure three-phase, four wire alternating current from static substations. All future extensions will be supplied from similar substations.

Tung Oil in Africa

Tung oil consumption has doubled in Great Britain in the last eight years, and from China, the main source of supply, it is becoming increasingly difficult to obtain adequate supplies of good quality. Since tung trees will grow over vast areas of East Africa—the most advanced experiments probably being those in the Kitale district of Kenya—the Dependencies have an opportunity of sharing in an attractive and expanding market. The chief uses of tung oil are in the paint and varnish industry, in resin-tung, in spar varnish (more satisfactory than copal varnish, formerly the standard), in driers, and in fire-proofing and water-proofing; its uses are, in fact, increasing as quickly as more of the raw material becomes available, and it is already a serious competitor to linseed oil. Tung is easy to grow, planting seeds at stake is generally more satisfactory than transplanting from a nursery. When mature it withstands drought, it is more or less indifferent to soil, though a light deep soil containing a fair amount of organic matter is best, it has a comparatively quick earning power, and readily permits of intercropping. As a subsidiary crop it has, therefore, much to recommend it to the serious attention of East Africans.

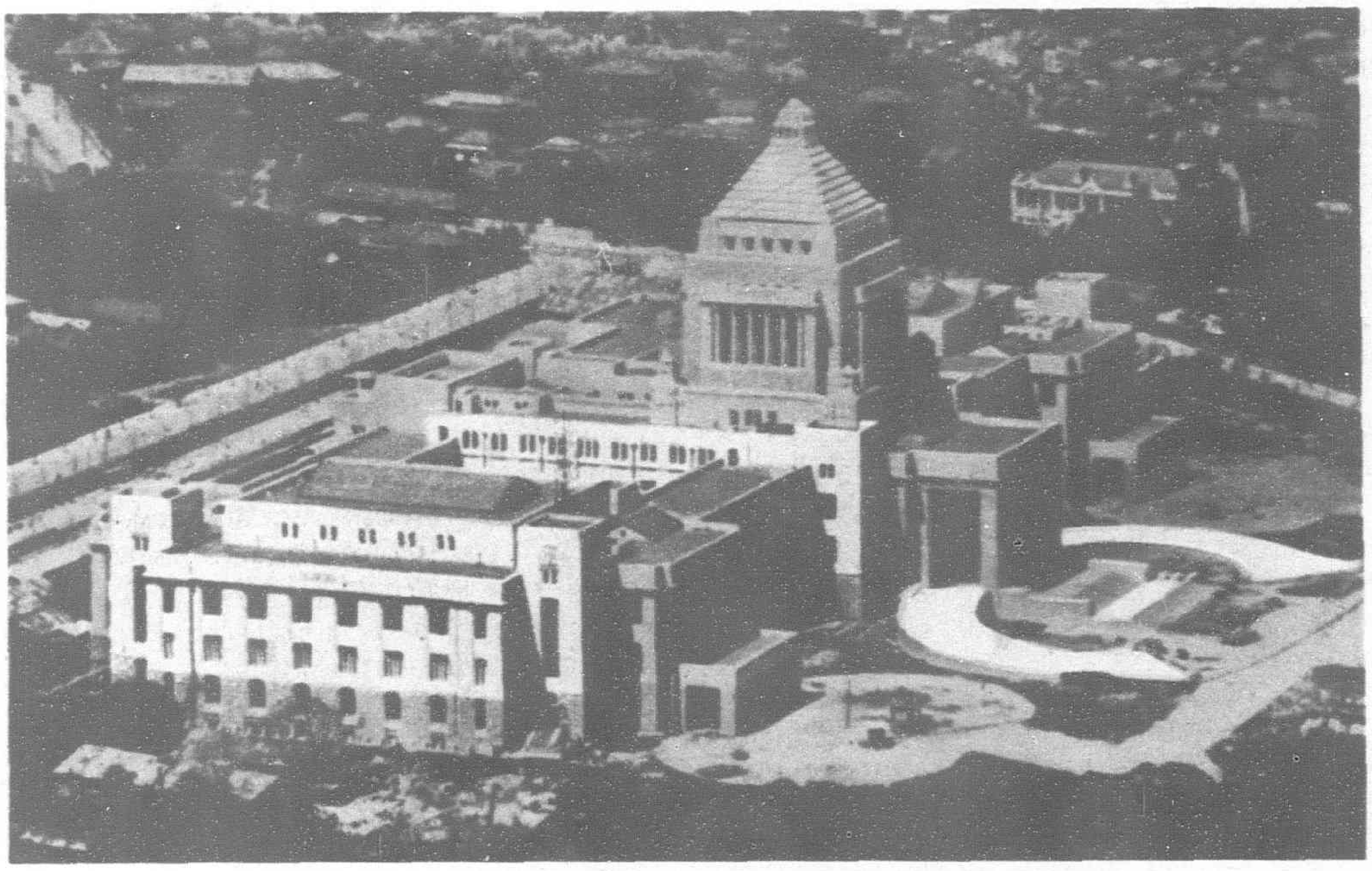


The Beacon in the East

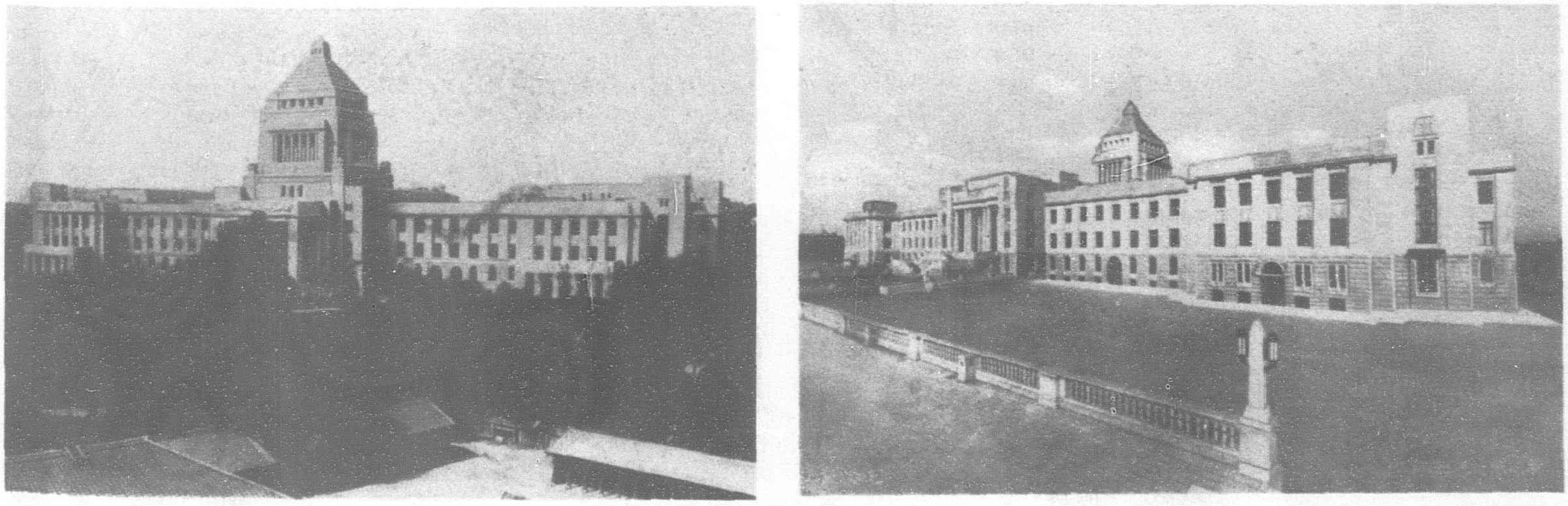
Japan's New Diet Building

BEFORE the date set for the next session of the Imperial Japanese Diet, the imposing new Parliament Building will be completed, furnished, equipped and ready for business. This magnificent public edifice towering above the heart of the capital of the Empire, is a pledge to the people that popular government will endure and a guarantee to the Nations that Japan will again take her accustomed place amongst the great Liberal Powers and contribute her full share to the attainment of those common ends which even in Western Europe, a community of traditions and mutual understanding took thousands of years to evolve into the present day conception of human rights and liberties.

Japan, a newcomer into the Family of Nations, that only eighty years ago emerged from feudalism, has made many mistakes on her upward march toward the light of Democracy. She may have approached the ideal of self-government by conceding to the people their rights from above, instead of having it extracted from entrenched power by means of civil warfare and bloody revolution. It is the first instance where autocracy has surrendered its prerogatives without the people having to pay the price in tears and sorrow. Japan has cast the die. Constitutional government will survive and, as the dangers which beset the Empire from without are removed, the Army and Navy will again bow to the will of the people expressed through their duly elected representatives and party cabinets in the same way that they accepted the mandate of the Liberals after the Great War, reduced their powers



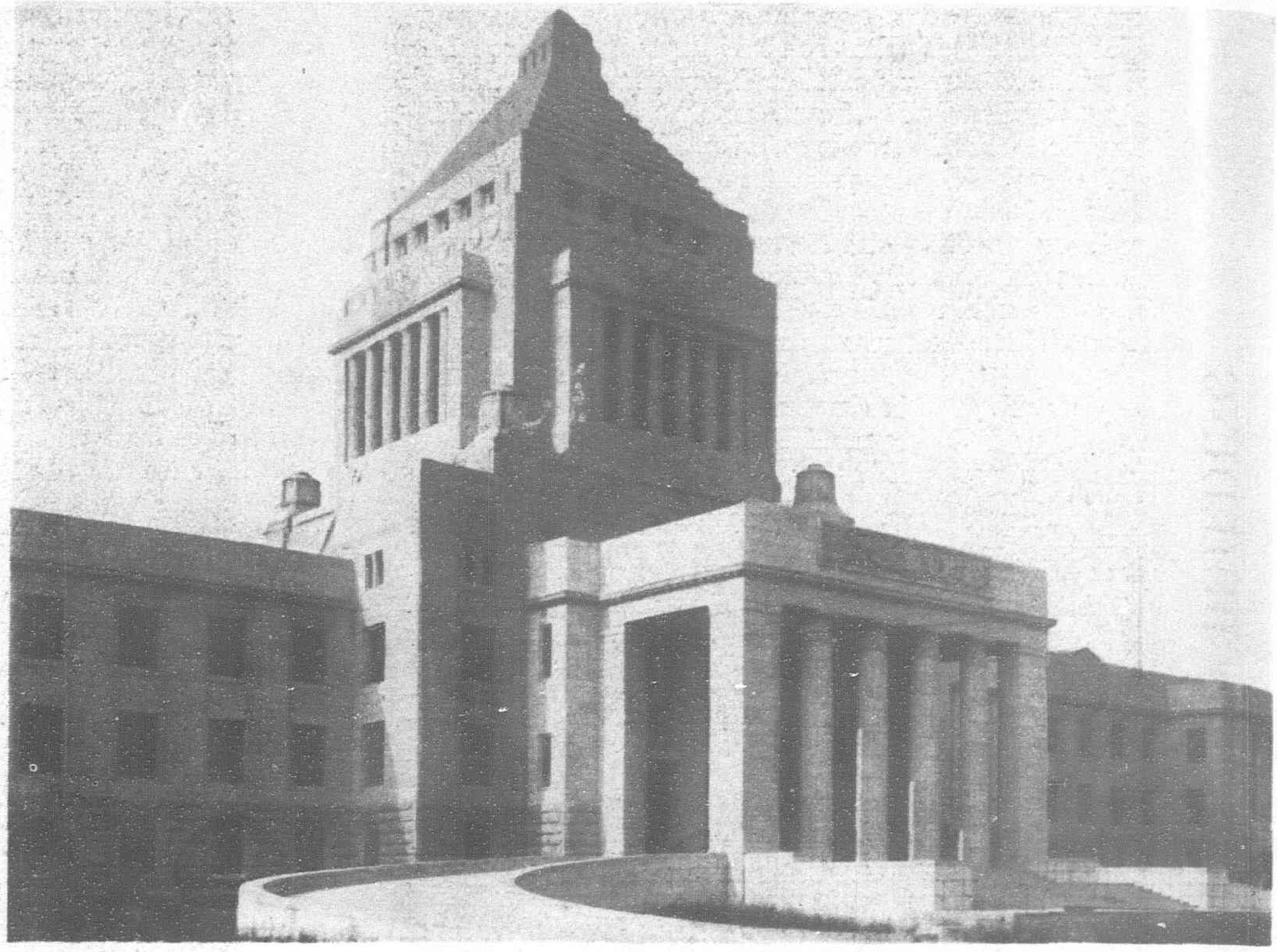
Aerial view of the New Diet Building



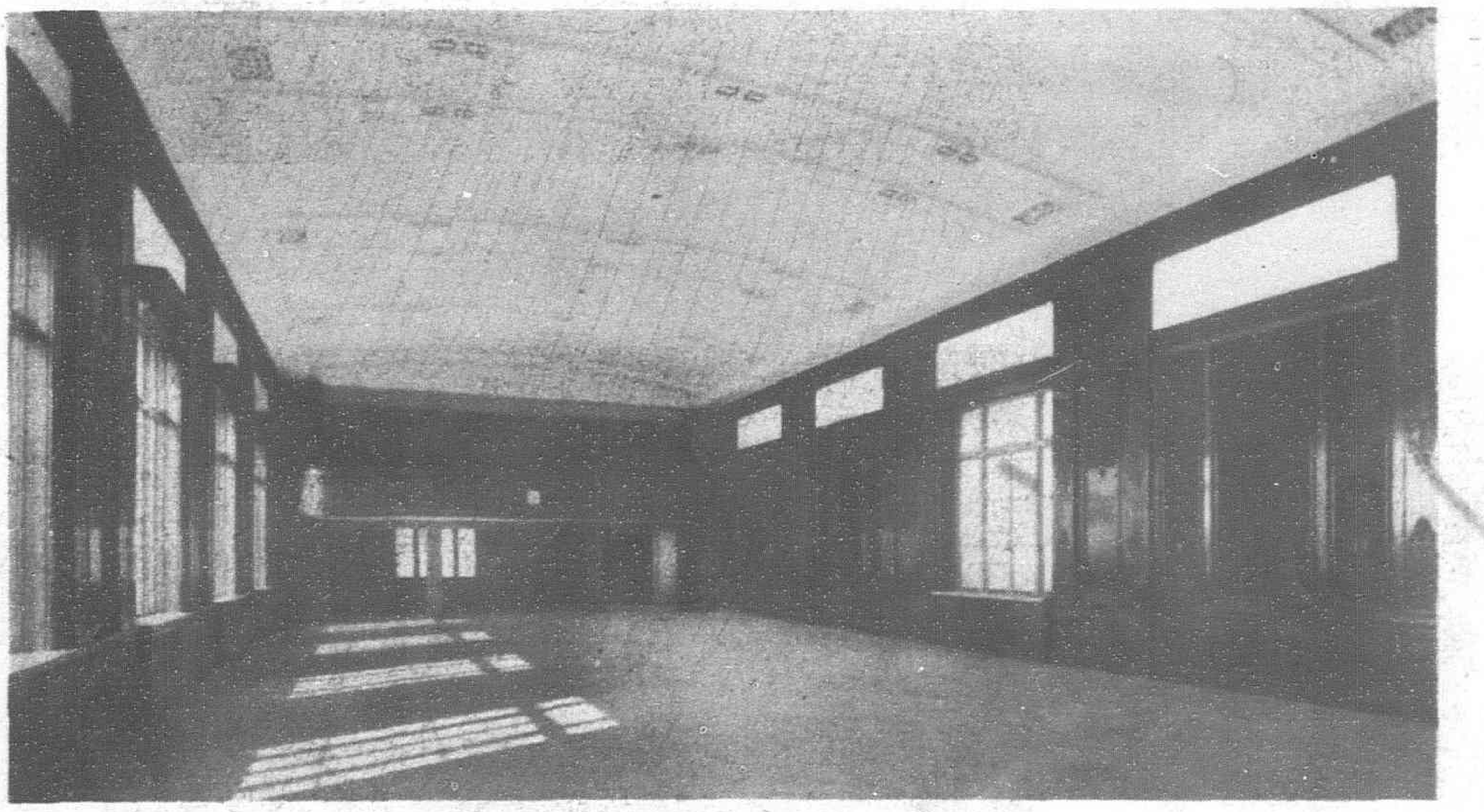
Front and Rear View of Diet Building

of defense and faded into the background of politics. The Army rules Japan today, just as it would in any other country in times of emergency. When its task is accomplished and the security of the Empire entrusted to its care for safe-keeping, is no longer menaced from without, the Japanese Army and Navy will release its pressure upon the more so-called liberal-minded, pacifically-inclined groups whose conciliatory and unrealistic diplomacy forced them to act in time to save the Empire from disaster. It is a passing stage.

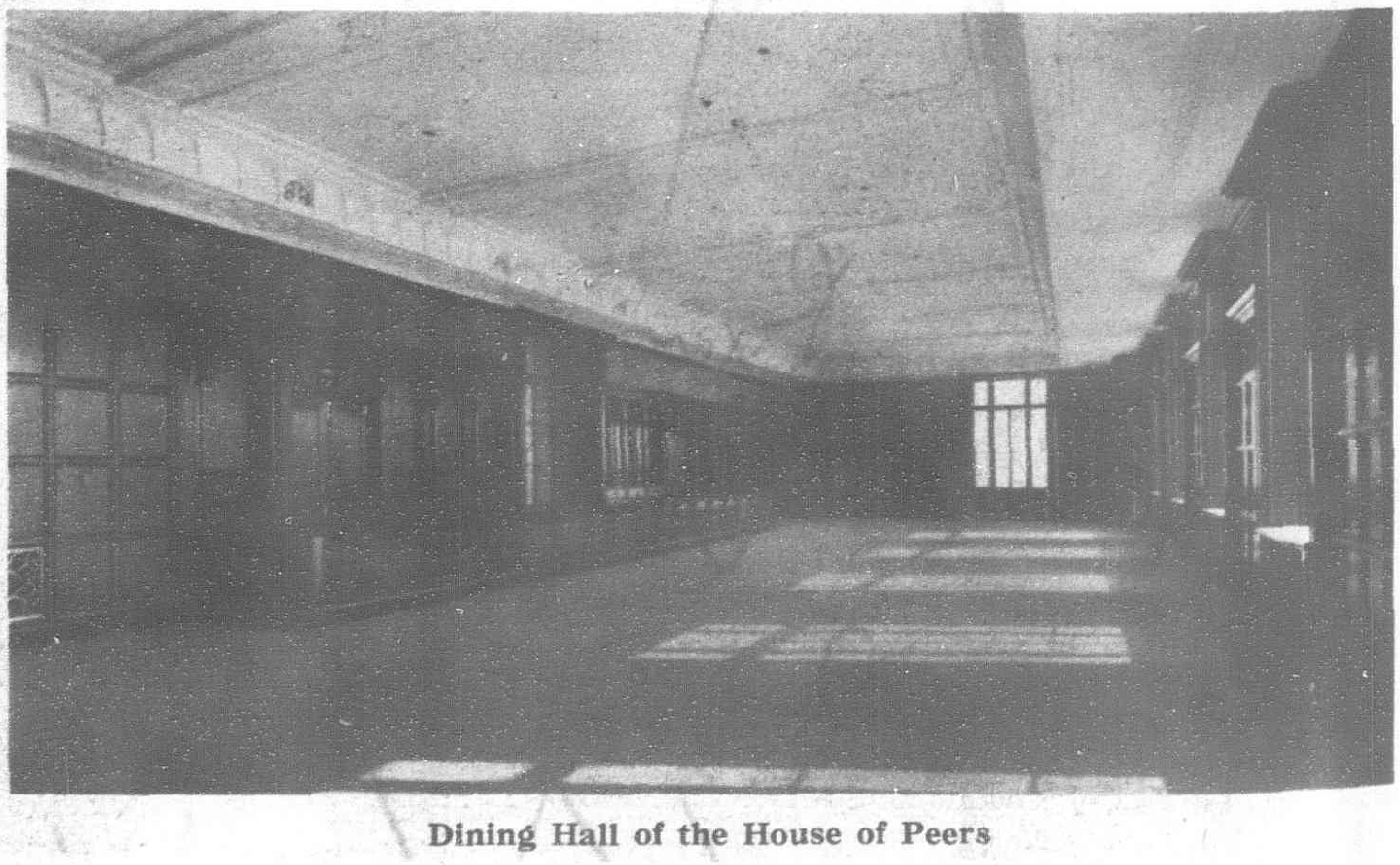
Outside of the three great Democracies of the West (the United States, Great Britain and France) popular government has practically ceased to exist. East of the meridian of Greenwich, only the tall white tower of the Diet Building of Japan stands as a beacon light of Democracy, operating, as in Great Britain, within the limits of a constitutional monarchy. It is a symbol of the future, of a new and greater Nippon which will carry on when the others who taught her the way, are only a memory.


Close up of the Imposing Main Entrance and Tower

As yet, little official or technical data on the architectural features of the new building have been prepared or released for public information. We are indebted to the *Japan Advertiser* for the following general information prepared by the various Bureaus concerned in its construction.


Budget Committee Conference Room of the Lower House

Of all the comments made on the new Diet Building, the one most often repeated is in regard to the marvelous site chosen—one from which the towering, stepped dome may be seen nearly all over the city. This site is a triangular shaped piece of land in Nagata-cho, known to Tokyo residents of long standing as the locality of the former Tokyo Lawn Tennis Club. There were at that time also two Government buildings on this site, one of them having to do with Cavalry replacements and the other the Privy Council Building, which has since been moved to the Imperial Palace grounds.

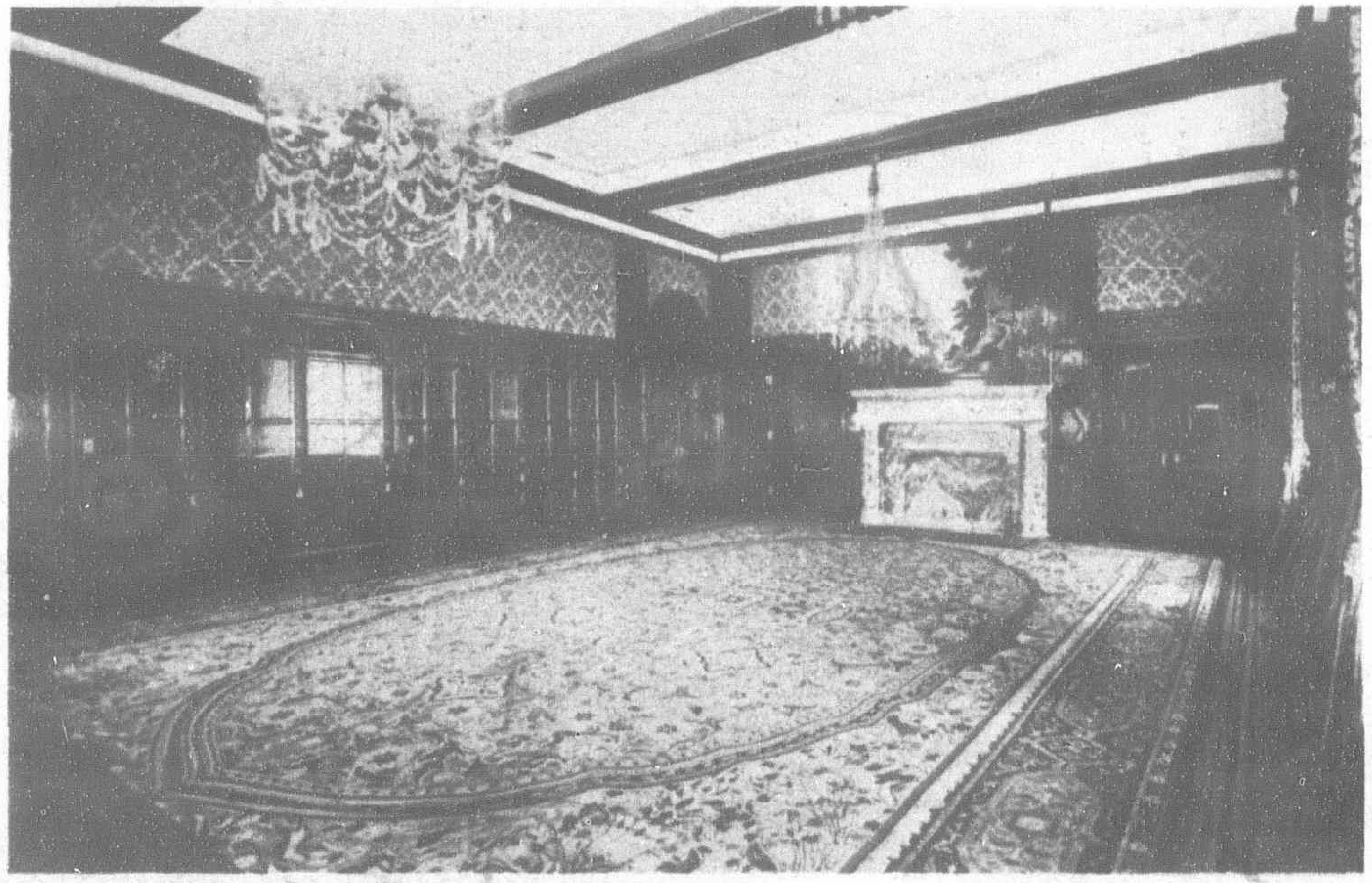

Dining Hall of the House of Peers

Site Considered Long Ago

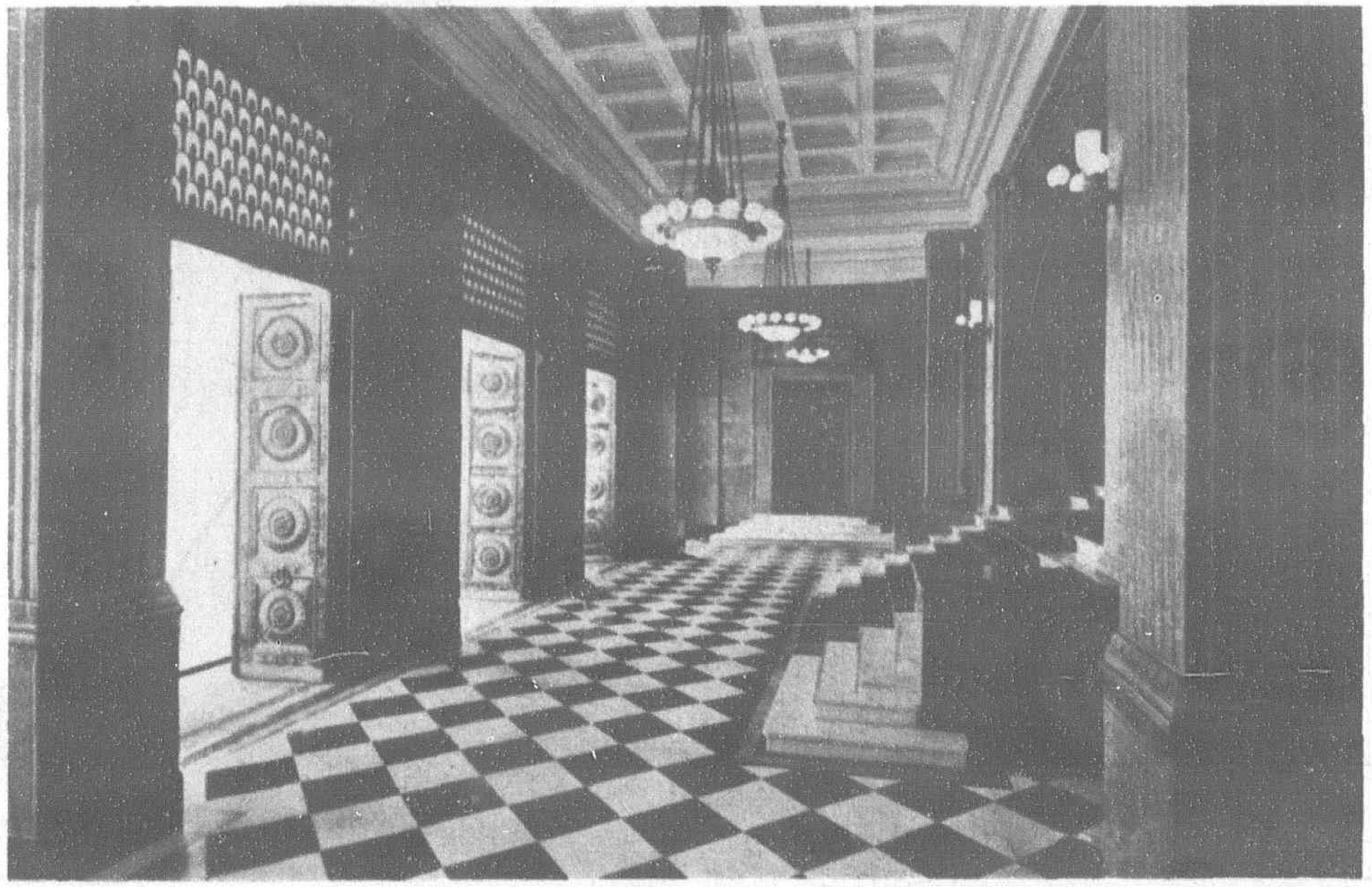
The idea of using this advantageous site for the Diet Building, began to take shape in the minds of Government officials as far back as fifty years ago, when Marquis Kaoru Inoue, Foreign Minister of the Meiji era, was particularly enthusiastic over the idea. Sixteen years ago, when the work first got under way, the late Dr. Y. Yabashi of the Finance Ministry was the chief architect in charge. The work has always been under the supervision of the Eizen Kanzai Kyoku, or the Bureau of Building and Repairs in the Finance Ministry, or Okurasho. The chief architect now in charge is Dr. Y. Okuma. So many different architects have worked and reworked on the plans that it is difficult to name an individual creator of the whole design, though the late Dr. Yabashi had much to do with the original plan.

The building is done in modified Rennaisance style of architecture with modern Japanese influences. The exterior is finished in blocks of white granite—rough hewn ones for the base and smoothly finished blocks for the upper part.

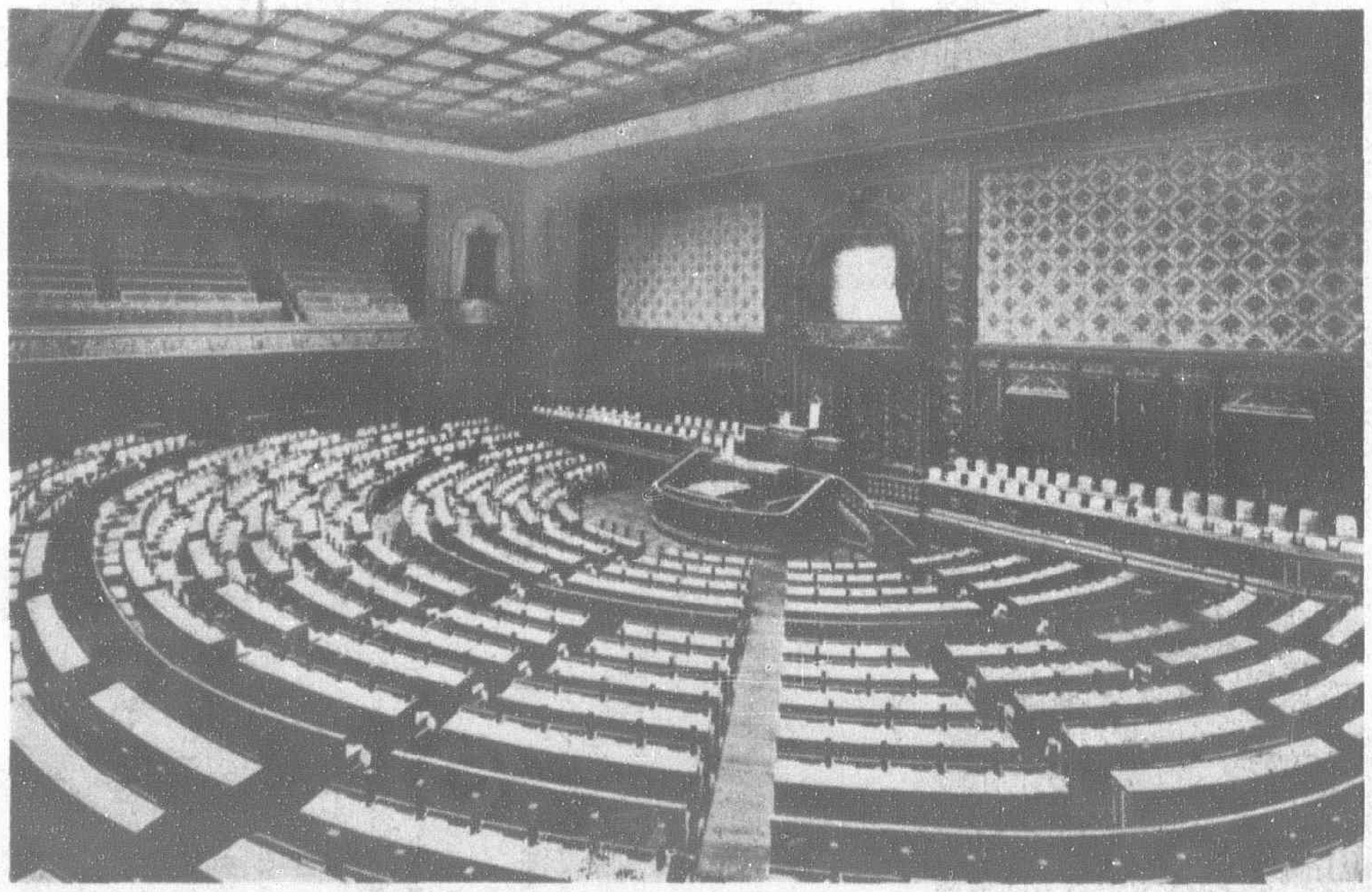
IMPRESSIVE DIGNITY MARKS INTERIOR OF DIET BUILDING



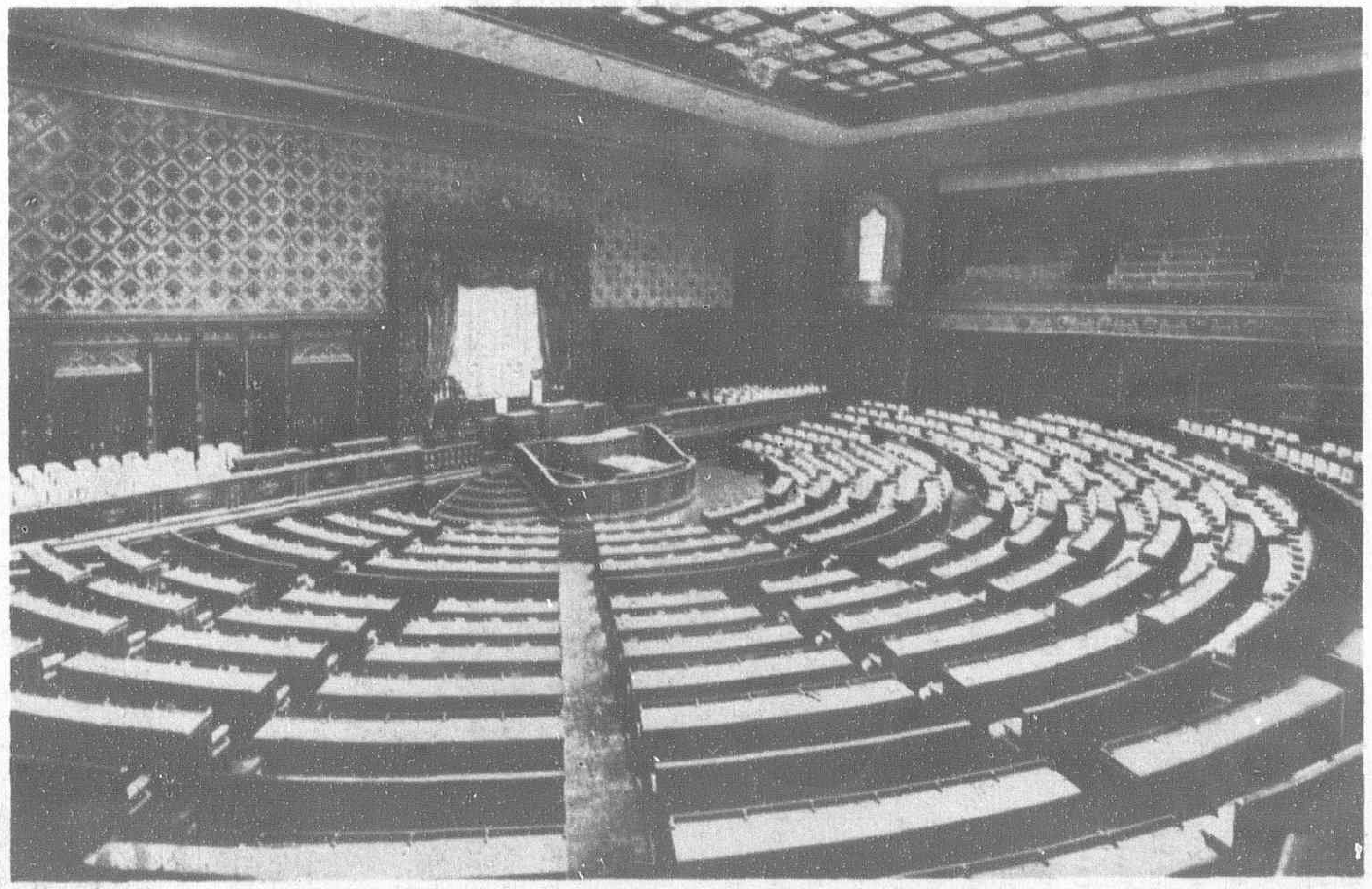
Reception Room of the President and Chairman



Entrance Hall



House of Representatives



House of Peers

The main entrance is just beneath the large central dome, and the building extends outward in two long wings, one on each side of this central structure, somewhat after the same fashion of the Capitol building in Washington, D.C. The two wings of the building are each broken by central enclosed court-yards, so that the rear facade also extends along unbroken line.

From the main front entrance, one enters the second story of the building. This is reached by a broad flight of shallow steps leading up to the massive colonnade which screens the five main doorways of heavily embossed metal. There is also a semi-circular driveway at each side of the steps, in order that the Emperor's carriage may be driven straight to the entrance doorways.

The entrance hallway is of lofty proportions. It is 216 feet from the floor to the ceiling, just beneath the stepped cupola that crowns the building. This ceiling is supported by four huge archways, beneath the tops of which are stained glass windows. The archways themselves are richly decorated with carved borders and mouldings, and the wall spaces in between the four arches are covered with landscape painting effects.

On the second floor are the two audience halls, one for the members of the House of Peers and the other for the members of the House of Representatives. These vast auditoriums, being respectively in the central portion of the two wings of the building, are lighted entirely from the ceiling, which is formed of panes of thick glass protected by a heavy metal grating. The assembly room for the House of Peers and that for the House of Representatives are both two stories in height, with balconies which may be entered from the third floor. The seats on the main floors of the rooms are arranged in a semi-circular formation facing the long platforms which run across the full length of the rooms. The walls are paneled in richly carved keyaki wood, with tapestry effects in the spaces above the platforms and heavy tapestry curtains draping the balconies and separate boxes.

When the Emperor visits the House of Peers he will be conducted from the main entrance hallway to a special reception room on the third floor, and from this will proceed to the Imperial seat which is approached from the third-floor level.

Other Details

The other rooms on the second floor open from the long corridors which run parallel with both the rear and front facades. These are individual rooms for the members of both Houses. In the rear of the audience halls are two dining rooms, one for the members of the House of Peers and the other for the members of the House of Representatives.

The rooms on the first floor of the building, which one enters from ground floor doorways at the sides of the central portico, are mainly for clerks and other employees connected with the Diet. There will probably be a few shops also on the first floor, and there is a large dining room just beneath the central hallway on the second floor and two smaller dining rooms toward the back.

The basement is given over to the heating plant, an electric transformer room and a printing plant. The building will be heated by both hot air and steam. The water which will be used in the air ventilating system will be piped into the basement from two deep wells which are underneath the enclosed court-yards at the sides of the central portion of the building. These wells have also an æsthetic purpose, as there is a fountain in each enclosure, surrounded by an oblong shaped basin that will become a shallow pond when the fountain is playing.

From the roof gardens on each side of the stepped dome one may obtain marvelous view of Tokyo, looking out over the palace most from the front side of the building, and on clear days as far as the Boshu peninsula on the Tokyo Bay side. There is an even better view, of course, from the square tower that tops the dome, to which one may go part way by elevator and the rest of the way by a winding staircase.

390 Rooms in Building

The site of the new Diet Building covers 20,946 *tsubo*, or 17.04 acres. The front facade measures 681 feet from end to end, and the width of the building, from the front to rear entrance, is 292 feet. There are 390 rooms in the structure, and the auditoriums for the House of Peers and House of Representatives are provided with a maximum floor seating capacity of 635 persons each. In the gallery of the Upper House there are seats for 770 persons and in the Lower House for 922.

The materials used in the new Diet Building have almost all come from different parts of Japan. The granite and various kinds of marble used in the exterior have come from Hiroshima, Kyushu and Okayama, and the keyaki and hinoki woods from forests in many places in the country. The decorative motifs used in the wood carvings and mouldings around the archways are taken from ancient Japanese folk lore and mythology. Stone slabs with carved relief designs of the phœnix are used on the exterior, just above the colonnades which support the central dome from the outside. The phœnix is the Japanese symbol of eternity, the bird credited with the power of rising anew from its own ashes.

When the Diet Building was first started there were certain days when as many as 500 workmen laborers were working on it at one time. Now that so much less of the work remains to be done, the workmen average between 50 and 100 in number daily. It is expected that the structure will be complete, both inside and out, by next June, and plans are being made for an elaborate inauguration ceremony which will probably take place next November.

HYDRO POWER FOR SUNGARI

The Manchuria Electric Company of Hsinking has drafted a plan for the erection of the first hydro-electric plant in Manchoukuo and has decided to raise the necessary Y.15,000,000 for its accomplishment by issuing debentures or by increasing its capitalization, according to the *Nichi Nichi*. The plan will be submitted for approval to the Ministry of Industry in the Kwangtung Government and to the Kwantung Bureau in the Japanese Embassy at Hsinking.

General Toyohiko Yoshida, president of the company, will go to Tokyo shortly to negotiate for funds with the financial community. The plan, it is understood, would be carried out over five years, with a large station erected on the Sungari River.

The first water power station of the Choshinko Hydro-Electric Company was recently completed in North Korea, according to the *Asahi*. The company has started service of 15,000 kw. for the Godo Electricity Company of Heijo. The Choshinko Company was founded with capitalization of Y.20,000,000 in May, 1911, under the Korea Electricity Control Act. Its parent company was the Korean Nitrogen Company, which is associated with the Japan Nitrogen Company of Osaka, of which Mr. Jun Noguchi is president. Work was started almost immediately on the great 108,000 kw. station, with a cost of Y.30,000,000. It is said to be the largest in the Orient. Work on the second-period construction will start in the near future. At the end of the fourth period, the concern will have a capacity of 32,000 kw. Of 108,000 kw. now available, half will be taken by Korean Nitrogen and the balance sold to the general public.

Mr. Kenji Ishimoto, director of the South Manchuria Railway Company, recently interviewed Mr. Koichiro Ishihara, president of the Ishihara Industry Company, in connection with the possibilities of industrial exploitation of East Indian lands, such as Malaya and the Dutch East Indies, in which Ishihara Industry is heavily interested. The *Nichi Nichi* understands from this that the railway does not intend to limit its sphere of activities to Manchuria and China.

The Kwansai Joint Steam Power Company of Osaka, which had intended to start service of 100,000 kw. with two 50,000 kw. generators on December 1, is unable to do so. Serious mechanical defects have been discovered in both generators, the Kokumin reports. They are said to be of foreign make. The Communications Ministry has ordered the company not to use the foreign generators and they will probably be replaced by domestic machines.

Engineering Notes

AVIATION

NEW AIR LINES.—For the network of twelve new air lines, covering 9,315 miles, which the Japanese Communications Ministry means to spread during the next ten fiscal years, superior airplanes are being purchased and tested.

NEW AERODROME FOR HONGKONG.—It is unofficially announced that work on the construction of a large aerodrome in Fanling, British leased territory, Hongkong, will begin in the near future in preparation for the arrival of new aircraft from home.

SINGAPORE AERODROME—An important advance in the construction of the Singapore civil aerodrome is revealed in the *Straits Settlements Government Gazette*, which recently invited tenders for the supply and erection of a reinforced concrete seaplane slipway. This contract includes sheet piling and a reinforced concrete wharf, and is a preparation for the Empire flying boat service between England and Australia.

ELECTRICAL

NEW LIGHTING SYSTEM—The new lighting system installed by the Kinta Electric Distribution Board was switched recently. The effect was splendid and the main street an example of modern efficient street lighting.

ELECTRIC LIGHT IN SIAN.—A new municipal electric light plant marks a stage in the modernization of Sian, the capital of north-east China. All the main streets are being connected up. Modern drainage is also being installed, and the main roads are being dug for the building of a sewer main.

NEW POWER STATIONS.—Consideration is being given by the Japanese Government to the plans of the North-Eastern Development Power Co., Ltd., for establishing generating stations with a total capacity of 148,000 kw. on Lake Tazawa and the Okuirise, Miyako, Yakuwa and Abukama Rivers.

HYDRO-POWER SCHEME—Manchuria Electric Company of Hsinking plans the erection of the first hydro-electric plant in Manchoukuo, and has decided to raise the necessary Y.15,000,000 by issuing debentures or increasing its capital. The plan, it is understood, would be carried out over five years, with a large station erected on the Sungari River.

TOKYO ELECTRIC EQUIPMENT.—Sanction has been given by the Communications Ministry to the Tokyo Electric Light Co., for installing new equipment in its Tsurumi steam power plant, on condition its steam plants at Tajima and Kanagawa should be either reduced or abolished. Tokyo Light will install two dynamos, each capable of generating 50,000 kilowatts of power.

NEW POWER STATION.—Taiwan Electric Power Co. has decided to construct a 43,500 kw. generating station due to the prospective power demands of the Japan Aluminium Reduction Co., recently founded by large business interests in Formosa. The new station will utilize water from the spillway of Jitsugetsutan Power Station No. 1. It will cost Y.7,500,000. Work was to start last October and be complete at the end of 1937. Taiwan Power now generates 144,050 kilowatts.

KYUSHU POWER CONCERN.—Fundamental plans for the West District Joint Steam Power Generation Company have been adopted by the Kyushu Hydro-Electric Power, Kyushu Electric Trolley, Kyushu Power Transmission, Kyushu Joint Steam Power Generation, and Japan Iron Manufacturing Companies. The company, capitalized at Y.5,000,000, plans to generate power to a maximum of 100,000 kilowatts, but the first period generation will be 25,000 kilowatts.

HYDRO-ELECTRIC PROJECTS.—The construction of five hydro-electric stations on the Sungari is recommended by a party of fifteen Government engineers which has spent nearly a year journeying through Kirin, Fengtien, Chientao and Antung provinces. About 500 kilometers were traversed over the frozen Sungari and its tributaries before the commission, led by Mr. Takaroshi Abe, of the Ministry of Industry, returned to Hsinking. If the scheme materializes a further 80,000 kw. of power will eventually be available.

ELECTRIFICATION FOR MANCHOUKUO—A five-year plan for the electrification of Manchoukuo is to be launched this year. The Manchoukuo Electricity Company, according to a Nippon Dempo dispatch, plans an outlay of Y.17,000,000 on new equipment. The plan involves the following points: (1) Construction of 14,000-kilowatt steam power generation plants in Hsinking and Harbin. (2) Improvement and unification of electric power transmission and distribution facilities. (3) Completion of a 5,000-kilowatt station at Kuoliukang. (4) Increased transmission equipment at Hailun, Hailar, Wuchang, Shuangchengpu, Wangyehmiao and other towns.

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SHIPPING

M/V D. B. CRANE—The small motor vessel *D. B. Crane*, which has been built to the order of a British firm for coasting service at Borneo, Brunei and Sarawak, is designed to carry ninety tons of cargo and ten tons of fuel oil, stores, etc. She has a flat plate keel, straight stern and elliptical counter stern, is rigged with one steel pole mast and steel derrick to handle lifts of one ton, and embodies a hand-operated windlass, winch and steering-gear. The motor installation consists of a Polar marine oil engine developing 180 b.h.p. at 450 r.p.m.

SANMENWAN BAY—As a step to enhance the prosperity of Chekiang, the Provincial Department of Reconstruction is planning to develop Sanmenwan, a bay into an east coast port. The suggestion was made as early as 1914, but owing to various difficulties, has so far not been realized. According to the scheme, the first stage will be reclamation by labor-relief. It is estimated that $500,000 will be needed for this purpose. Situated about the middle of the east coast of China, Sanmenwan holds a key position as regards communications, coastal and inland.

CHEKIANG'S NEW PORT—A comprehensive scheme for the development of a commercial port at Sanmenwan, eastern coast of Chekiang, has been worked out by the chairman of the Chekiang Provincial Government. Road construction and water conservancy have already started. A highway now being built along the bay will be opened in three months. Surveys also have been completed for dams to facilitate land reclamation work. Sanmenwan is considered ideal for a commercial port, in view of the rich soil, dense forests and mineral deposits.

WHAMPOA DEVELOPMENTS—The River Conservancy Commission of the Kwangtung provincial government has decided to take steps to develop Whampoa into a modern port. The work will be spread over four stages, during the first of which a bund 4,200-ft. in length will be built, on which will be erected six modern godowns. The second stage will see the opening of a public market, while during the third stage the harbor will be deepened to permit the entrance of large vessels. Finally, factories will be erected, and railway lines will be constructed connecting Whampoa with the Canton-Hankow line.

COMMUNICATIONS

FERRY ACROSS YANGTZE—To facilitate through rail traffic, the Kiangnan and Huainan Railway Administrations will jointly institute a ferry service across the Yangtze at Wuhu. The ferry boat, it is understood, will be similar in design to that plying between Nanking and Pukow for the Peiping-Shanghai through train service, and will be built at a cost of more than $700,000.

CANAL IN JAPAN—Thirty-eight years after the project was first advanced, construction of a Y.45,000,000 canal linking Tokyo with Yokohama will begin this year, under the joint auspices of Tokyo and Kanagawa Prefectures. In addition to the main canal, nine meters deep, another channel will be dug, parallel to it, for smaller vessels. The project will be completed in eight years. The excavated earth will be used for a vast reclamation project which aims at creating a new industrial zone in the suburbs of Tokyo.

NEW HIGHWAYS—A new highway linking Loyang, in western Honan, with Tungkwan, in eastern Shensi, was opened to traffic recently. Two routes for travellers are now available, either by the Long-Hai Railway which terminates at Sian, or the Loyang-Tungkwan and Sian-Tungkwan Highways. An official survey places the number of textile mills in Shanghai as 690 employing over 111,000 persons of whom 74,116 are engaged in the cotton textile industry, 30,715 in the silk textile, and 6,361 in the wool textile and dyeing industry.

KIANGSI CONSERVANCY—A six-year plan for the control of water-ways in Kiangsi has been announced, towards which $8,300,000 has been voted by the provincial government. The plan covers two major phases of work, namely, flood prevention and river conservancy.

NEW RAILWAY BRIDGE—The *Osaka Mainichi* published a report that a Japanese engineering firm has been given the contract for a railway bridge by the Siamese State Railways. The total tonnage of steel to be used in the construction is about 1,544 tons, and the price quoted is round about Tcs. 160,000. According to the report, twenty-nine firms sent in tenders of which twenty-eight others were from European and American firms. An English firm was given a contract of about 200 tons of culvert work.

SUBMARINE TUNNEL—Construction of the submarine tunnel linking the Main Island of Japan with north Kyushu will commence this year, according to a decision reached at a conference of Railway Ministry engineers. Work will be spread over a period of four years at a total cost of Y.18,000,000, of which, it is hoped, Y.3,000,000 will be included in the Railway Ministry's budget for the 1936-37 fiscal year. Decision was also reached to bore a tunnel between Komorie, Moji, and Teshimachi, near Shimonoseki, a distance of 3,335 meters.

PROGRESS IN HUNAN—In spite of financial uncertainty, road and railroad building are going on by leaps and bounds. The road to connect with Kwangsi is almost finished on the Hunan side, and the road to Kweilin, Kwangsi, is reported nearly completed. Work has begun on the Hengchow end of a motor road to Paoching. The engineer-in-chief of the Canton-Hankow railway has begun surveys for the road from Nanchang, Kiangsi, to Changsha, Hunan. The Hunan section of the Canton-Hankow railway has two big engineering problems—the two bridges over the Lo and Lei Rivers.

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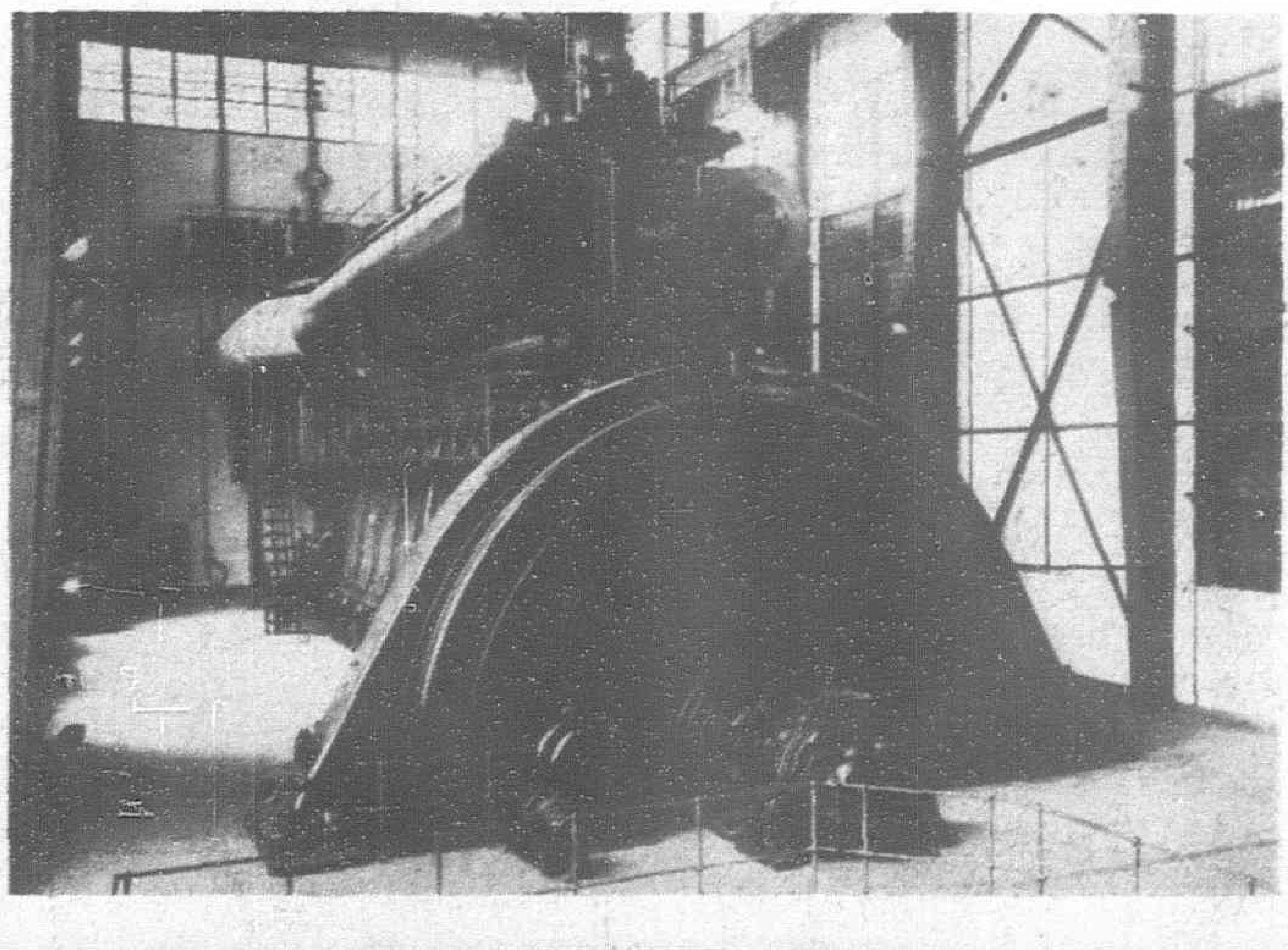

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